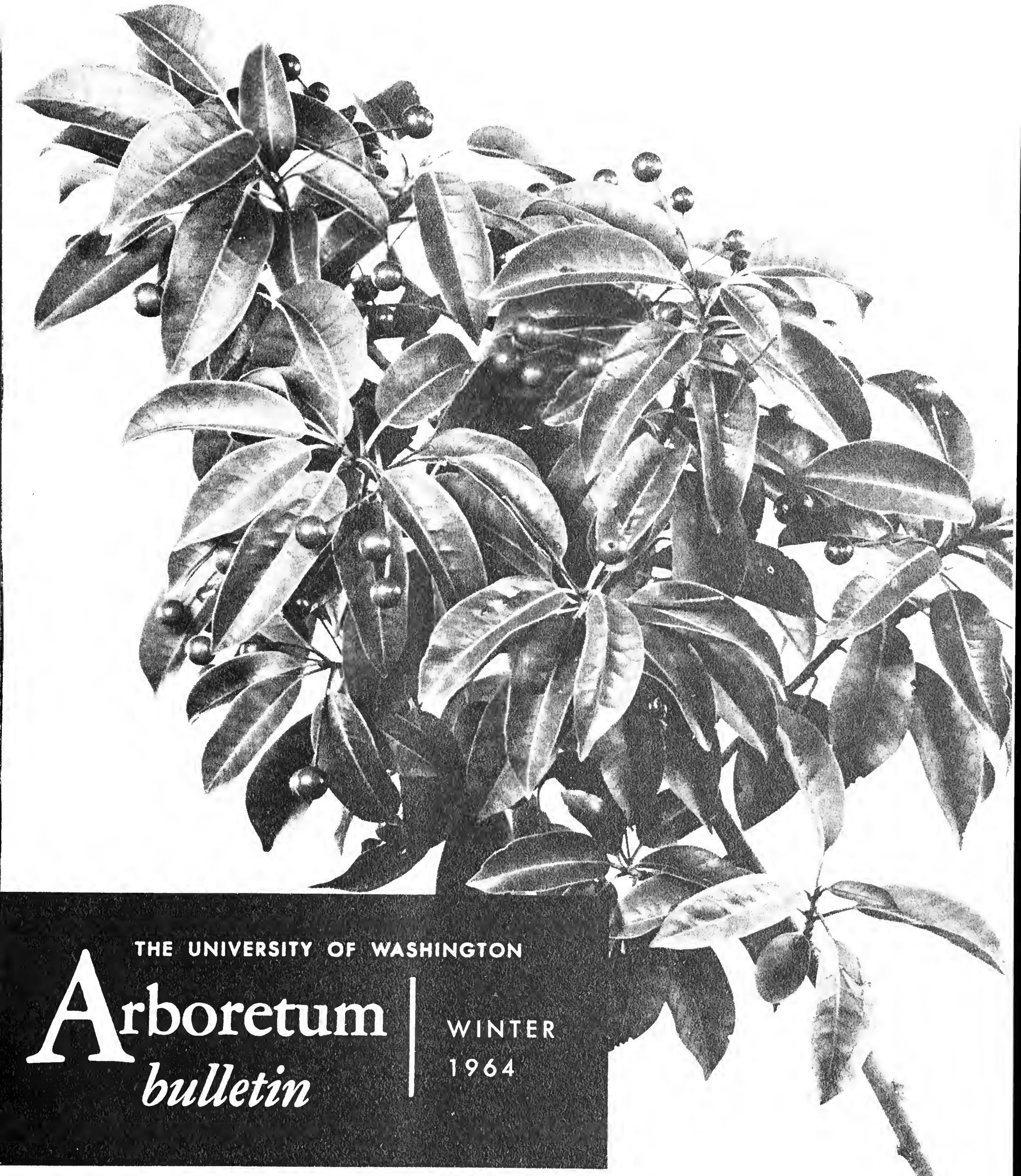

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COVER PHOTO:
Fruiting branch of *Ilex pedunculosa*
PHOTO BY: WILLIAM ENG

A Further Report on the International Friendship Grove

LLOYD THORP*

SANDWICHED in between two heavy lines of traffic on Campus Parkway at the north end of the University Bridge is a grove of 65 trees, all different, which have been maturing the idea of international good will for more than four years. The Arboretum supplied about half of these trees from its own stock, cooperated intensively in the overall program of procuring and selecting, and executed the actual planting except for token rituals.

We are talking about the International Friendship Grove which was established on the Parkway with much colorful ceremony on a pleasant Saturday, September 3, 1960, as a cementing event of the two-weeks-long Fifth World Forestry Congress held on the University of Washington campus. There was music by a uniformed military band, dedication speeches, the babble of many strange tongues, and colorful costumes of delegate-foresters from 65 countries around the world.

The story of this event has already been once told in the ARBORETUM BULLETIN (Winter 1960) by Mr. J. A. Witt, assistant director. However, there are additional interesting events preceding the planting that deserve unfolding. This is what we propose to do now, as well as to report on "How is the Grove Doing Now"?

Offhand, the planting of 65 trees of nursery size would seem no herculean task. But this was no ordinary planting. Each tree must have individual and distinct character. In some way it must remind of the home environment of the sponsoring nation. These were nations which ranged from Tierra del Fuego across the equatorial climes to the Arctic Circle. They were nations of black men and all shades of skin across the whole spectrum to the Nordic blonde; they were nations of widely differing customs and political philosophies; they were nations of plain and jungle and desert and mountain. There were other "musts", too, as we shall see, to complicate this particular planting.

Five months before the planting ceremonies the Arboretum received its first *official* word of participation. Carl Ostrom, of the U. S. Forest Service in the national capital, advised Director Mulligan that "we are going to hold a tree planting ceremony" on September 3 and asked him to serve on the "Tree Planting Committee for the World Forestry Congress".

Even as the word often outruns the deed, the Arboretum staff in anticipation had already prepared a "List of Young Plants Available in the Arboretum Nursery: March, 1960". It was arranged by "native to" areas and identified by botanical and common names. Nothing else.

Ostrom's name was to appear on much subsequent inter-committee correspondence. A brief mention here will point to some of the problems that would show up on the horizon. In mid-April Ostrom wrote that "it was a little too early to tell what stock will be needed, for the planting site has yet to be selected". And, he added, "I will send you a list of the participating countries as soon as I can get it". Also, not exactly as an afterthought, but really pertinent, he said the publicity men were suggesting that "we try to get trees 4 to 6 feet tall so that they will show up in photo and TV coverage of the ceremony".

So, on such incomplete specifications, the first lists of trees were pretty much made up on the basis of "What do we have in the store"? Revised lists added present height of planting stock and eventual attained height. That wasn't enough. It soon became obvious that there would be plenty of trees native to North America, Japan and Northern Asia and about half of Europe, but a critical shortage was shaping up of trees to represent the tropical countries. For one thing, even if obtain-

*Formerly advertising manager *Journal of Forestry*.

able, how would trees in this category survive in the Seattle climate? The Campus Way planting site as finally selected had plus factors for publicity and ceremonial purposes, but the botanist could wish for improvement. The western end tilts into a steep north-facing slope which poses shade and waterlogging problems. As the planting realities for the grove shaped up it also proved to be rather cramped.

There were other worries, often more diplomatic than botanical. There was more to it than just trying to select a tree that (1) would have a decent chance of survival in the Seattle climate and (b) in some aspect be representative of the nation which sponsored it. There were many, many shuffles and redrawn lists before the 65 trees were finally planted, each where it is now. Larger trees were nice for photographs and TV men, but they are much harder to move in a hot weather month. The trees had to be somewhat uniform in size because in the World Forestry Congress nations were equals. Some selections were easy, such as Norway Spruce for rockbound Norway — but what do you select, for example, from your list of "availables" and "will probably survives" for Gabon, Ghana and Guatemala?

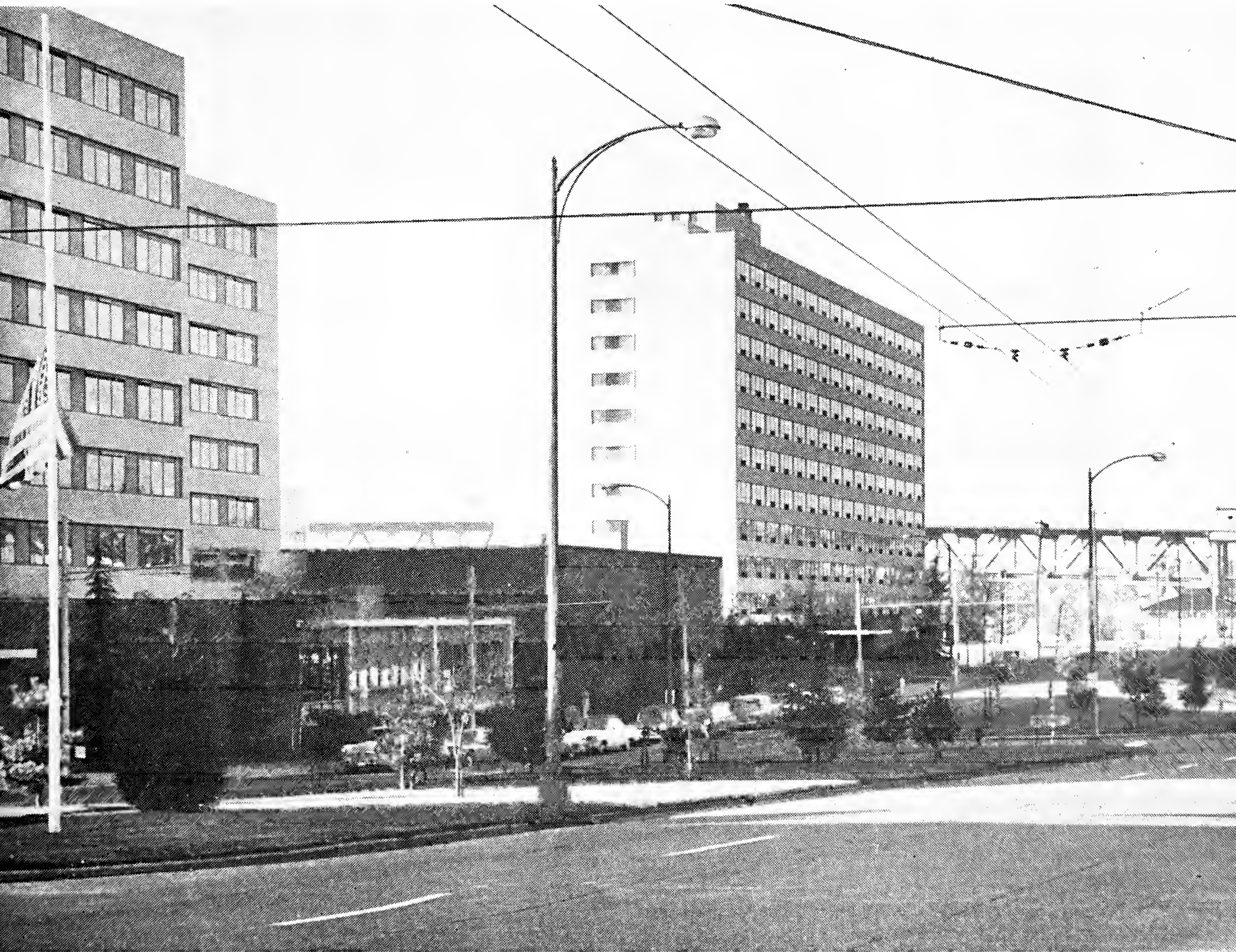
(EDITOR'S NOTE — *Quercus prinus, Acer macrophyllum,* and *Pinus strobus,* in that order.)

There were changes right down to the wire. These were due, among other things, to uncertainties with respect to a firm list of participating nations, late changes in preference by delegates, and so on.

Finally, the target was set to stake out the individual tree locations, specifically assign the trees to their sites, dig the holes, and actually set the trees in the holes the week of August 29th — with a neat little pile of ceremonial earth by each tree. The Arboretum staff made it all right, but the file shows a "last" list as late as August 26th and it, too, has changes. India requested that *Cedrus deodora* be substituted for Himalayan pine and

The International Friendship Grove

FIG. 7 PHOTO BY: WILLIAM ENG



in an eleventh-hour switch the U. S. S. R. wound up with Siberian Larch *(Larix sibirica)*.

The planting ceremonies, as Mr. Witt has already told, were both colorful and successful. All the preceding problems were submerged in the smooth rites. The visiting foresters lovingly caressed their trees, stirred the Parkway soil. They have long since departed for Australia and Chile and India and Finland and elsewhere. What of these trees of international good will in the four years since elapsed?

Survival has been exceptionally good. There have been, of course, some casualties. Two of these occurred the first year and, surprisingly, one was the supposedly superhardy pioneering lodgepole pine. The Arboretum has made replacements, so that today the ranks are still undepleted. There has been some trimming for injuries and for shaping. The University has added low shrubbery to contain the steep west end and installed some winding walkways of crushed rock.

That there is a continuing interest in the Grove, world-wide, one can have little doubt. Visitors from far-away lands have frequently appeared on the campus and asked to be directed to the Grove and "their" tree.

The summer following the planting the author photographed many of the trees in color and took prints with him to Europe. These he gave to foresters in a number of countries as a simple gesture of courtesy. The contacts were personal, in a number of cases directly with men who had attended the World Forestry Congress the previous year. It was only a little thing, but the genuineness of the interest and appreciation expressed by these

(Continued on Page 113)

Trees in the International Friendship Grove

Country — Common Name — Scientific Name

Argentina
- Roble southern beech — *Nothofagus obliqua*

Australia
- Alpine Ash — *Eucalyptus gigantea*

Austria
- Austrian pine — *Pinus nigra*

Belgium
- Norway maple — *Acer platanoides*

Brazil
- Johnston eucalyptus — *Eucalyptus johnstonii*

Bulgaria
- Tatarian maple — *Acer tataricum*

Burma
- Oriental arborvitae — *Thuja orientalis*

Cameroun
- Hinds walnut — *Juglans hindsii*

Canada
- Sugar maple — *Acer saccharum*

Chile
- Dombey southern beech — *Nothofagus dombeyi*

China
- China fir — *Cunninghamia lanceolata*

Colombia
- Noble fir — *Abies procera*

Czechoslovakia
- European mountain-ash — *Sorbus aucuparia*

Denmark
- Northern red oak — *Quercus rubra*

Finland
- European white birch — *Betula verrucosa*

France
- Sycamore maple — *Acer pseudoplatanus*

Gabon
- Chestnut oak — *Quercus prinus*

Germany
- European beech — *Fagus sylvatica*

Ghana
- Bigleaf maple — *Acer macrophyllum*

Greece
- European hop-hornbeam — *Ostrya carpinifolia*

Guatemala
- White pine — *Pinus strobus*

Haiti
- Sweetgum — *Liquidambar styraciflua*

Honduras
- Sugar pine — *Pinus lambertiana*

Hungary
- European hackberry — *Celtis australis*

Iceland
- Sitka alder — *Alnus sinuata*

India
- Himalaya cedar — *Cedrus deodora*

Indonesia
- Golden chinkapin — *Cartanopsis chrysophylla*

Iran
- Flowering ash — *Fraxinus ornus*

Ireland
- White beam — *Sorbus aria*

Israel
- Oriental hornbeam — *Carpinus orientalis*

Italy
- Montpellier maple — *Acer monspessulanum*

Ivory Coast
- Subalpine fir — *Abies lasiocarpa*

Japan
- Japanese red pine — *Pinus densiflora*

Jordan
- Lindley cypress — *Cupressus lindleyi*

Korea
- Korean pine — *Pinus koraiensis*

Lebanon
- Lebanon cedar — *Cedrus libani*

Liberia
- Red spruce — *Picea rubens*

Country — Common Name — Scientific Name	
Malagasy	
Lodgepole pine	*Pinus contorta*
Malaya	
Paper mulberry	*Broussonetia papyrifera*
Mexico	
Patula pine	*Pinus patula*
Nepal	
Smith spruce	*Picea smithiana*
Netherlands	
Little-leaf linden	*Tilia cordata*
New Zealand	
Red southern beech	*Nothofagus fusca*
Norway	
Norway spruce	*Picea abies*
Pakistan	
Himalaya horsechestnut	*Aesculus indica*
Peru	
Boxleaf azara	*Azara microphylla*
Philippines	
Western redcedar	*Thuja plicata*
Poland	
Polish larch	*Larix polonica*
Portugal	
Portuguese laurelcherry	*Prunus lusitanica*
Rumania	
Macedonian pine	*Pinus peuce*
Spain	
Cork oak	*Quercus suber*
Sudan	
Port Orford cedar	*Chamaecyparis lawsoniana*
Sweden	
Scots pine	*Pinus sylvestris*
Switzerland	
Golden-chain tree	*Laburnum alpinum*
Thailand	
Pacific madrone	*Arbutus menziesii*
Tunisia	
Algerian fir	*Abies numidica*
Turkey	
Turkey oak	*Quercus cerris*
Union of South Africa	
Western larch	*Larix occidentalis*
Union of Soviet Socialist Republics	
Siberian larch	*Larix sibirica*
United Kingdom	
English oak	*Quercus robur*
United States	
Douglas fir	*Pseudotsuga menziesii*
Uruguay	
Engelmann spruce	*Picea engelmannii*
Venezuela	
Eastern hemlock	*Tsuga canadensis*
Viet-Nam	
Saghalin spruce	*Picea glehnii*
Yugoslavia	
Serbian spruce	*Picea omorika*

The Native Evergreen Ceanothus of the Pacific Northwest

R. L. TICKNOR*

ALTHOUGH California is the center of distribution of Ceanothus and some of our most attractive varieties, such as *C. impressus* 'Puget Blue' and *C. gloriosus,* come from there, five evergreen species of Ceanothus are native to the Pacific Northwest. Only one species, *C. velutinus,* is found throughout the area. Two species, *C. cuneatus* and *C. prostratus,* are distributed from the northern to southern borders of Oregon. The latter is found also in Klickitat County, Washington, and has been reported in Adams County, Idaho. The other two species, *C. pumilus* and *C. thyrsiflorus,* are confined to southwestern Oregon.

Descriptions of the Species

Ceanothus cuneatus: Narrowleaf Buckbrush is usually an erect shrub 3 to 8 feet tall, but some forms are prostrate. The gray-green leaves are ¼ to ¾ inch long and are obovate in shape with a rounded apex and wedge-shaped base. The white flowers are small and are borne in loose clusters.

Ceanothus prostratus: Squaw Carpet is a prostrate shrub which forms mats up to 10 feet across. The dark green leaves, resembling miniature holly leaves, are from ¼ to 1¼ inches long. The flowers are usually a pale lavender but vary from white to dark purple-blue.

Ceanothus pumilus: Dwarf Ceanothus is a prostrate shrub which forms mats up to 6 feet across. The narrow, dark green leaves are ⅛ to 1 inch long with three teeth at the apex. The small blue flowers are borne in a few-flowered umbee.

Ceanothus thyrsiflorus: Blueblossom is variable in habit. It is usually an erect shrub to 12 feet, sometimes a small tree to 20 feet tall, or low or prostrate-growing in exposed sites. The dark green, glossy leaves are ¾ to 2 inches long, oblong-ovate to elliptical in shape, and prominently three-veined from

*Associate Professor of Horticulture, Oregon State University, North Willamette Experiment Station, Aurora, Oregon.

the base. The small blue or rarely white flowers are borne in dense clusters up to 3 inches long.

Ceanothus velutinus: Snowbush grows from 2 to 10 feet or more in height with light green stems. The dark, glossy green leaves are often sticky, especially in warm weather. The leaves are 1½ to 3½ inches long, broadly ovate to ovate elliptical, and are three-veined from the base. The small white flowers are borne in panicles 2 to 5 inches long. *C. velutinus* var. *laevigatus,* which grows in the Willamette Valley and Puget Sound areas, is larger in size and flower than the typical *C. velutinus* found in other areas.

Experimental Studies

Studies are underway at Oregon State University's North Willamette Experiment Station and at the University of Nevada, supported in part by U.S.D.A. Domestic Plant Exploration funds, to select plants and to develop cultural techniques for these plants. Several trips have been made in Oregon, Washington and Nevada to collect forms of *C. prostratus* and *C. pumilus*. Leaf size, leaf shape, color of bloom, amount of bloom, density of growth, disease resistance, winter hardiness, and geographic distribution have been considered in making selections. Areas of the most interest for the collection of *C. prostratus* have been in the region north and west of Goldendale, Washington, at the northern limit of distribution, and in the area north and west of Klamath Falls, Oregon, where the largest variation in leaf size occurs. Most flowers of *C. prostratus* are a faded lavender, but forms with white or purplish-blue flowers can be found.

Propagation

Because moving plants of these species in from the wild is almost always unsuccessful, techniques for cutting propagation have been developed. Cuttings taken in August have been rooted in 2 by 2 inch bands filled with perlite under both a mist system and plastic tent system. A rooting hormone such as Hormodin #3 aids rooting. Propagation in the bands so that a minimum disturbance occurs following rooting has greatly aided in the survival of these cuttings. By these techniques, all species except *C. velutinus* have been rooted.

All the species can be grown from seed. However, there are some obstacles to this means of propagation, besides the usual one of the exceptional type not reproducing true from seed. First, collecting seed is difficult because each seed capsule, which usually contains only three seeds, splits violently when ripe, scattering the seed. Second, at least with *C. prostratus,* a high percentage of the seed is infested with a seed weevil and is nonviable. Third, heat treatment followed by cold stratification is needed for best germination. Three seed heat treatments have been successful: (1) immersion in hot water from 185° to boiling for five minutes; (2) immersion in boiling water which is allowed to cool to room temperature; and (3) exposure to infra-red light for ten minutes at 168°F. After heat treatment the seeds should be stratified at 41° for sixty days. Even with these treatments some seed will not germinate until the second year.

Culture

A well-drained soil in a sunny or partially shaded location is a major requirement. Normally no watering will be needed for these species after they are established. Some tolerance to heavy watering is shown by *C. pumilus*. In the wild it has been observed growing in the beds of small wet-weather streams where the plants are completely immersed at times, but in this situation the excess water quickly drains away when the rain stops. As with many wild plants, satisfactory growth occurs without added fertilizer in soils of moderate fertility.

Since weeds often invade a ground cover planting before plants have grown a carpet dense enough to restrict the weeds, chemical weed control experiments have been conducted with *C. prostratus*. Treatments which have reduced weed competition, permitting better growth, include Atrazine at 1 pound per acre, Casoron at 5 pounds per acre, or Simazine at 2 pounds per acre, as well as a mulch of ground bark.

Uses

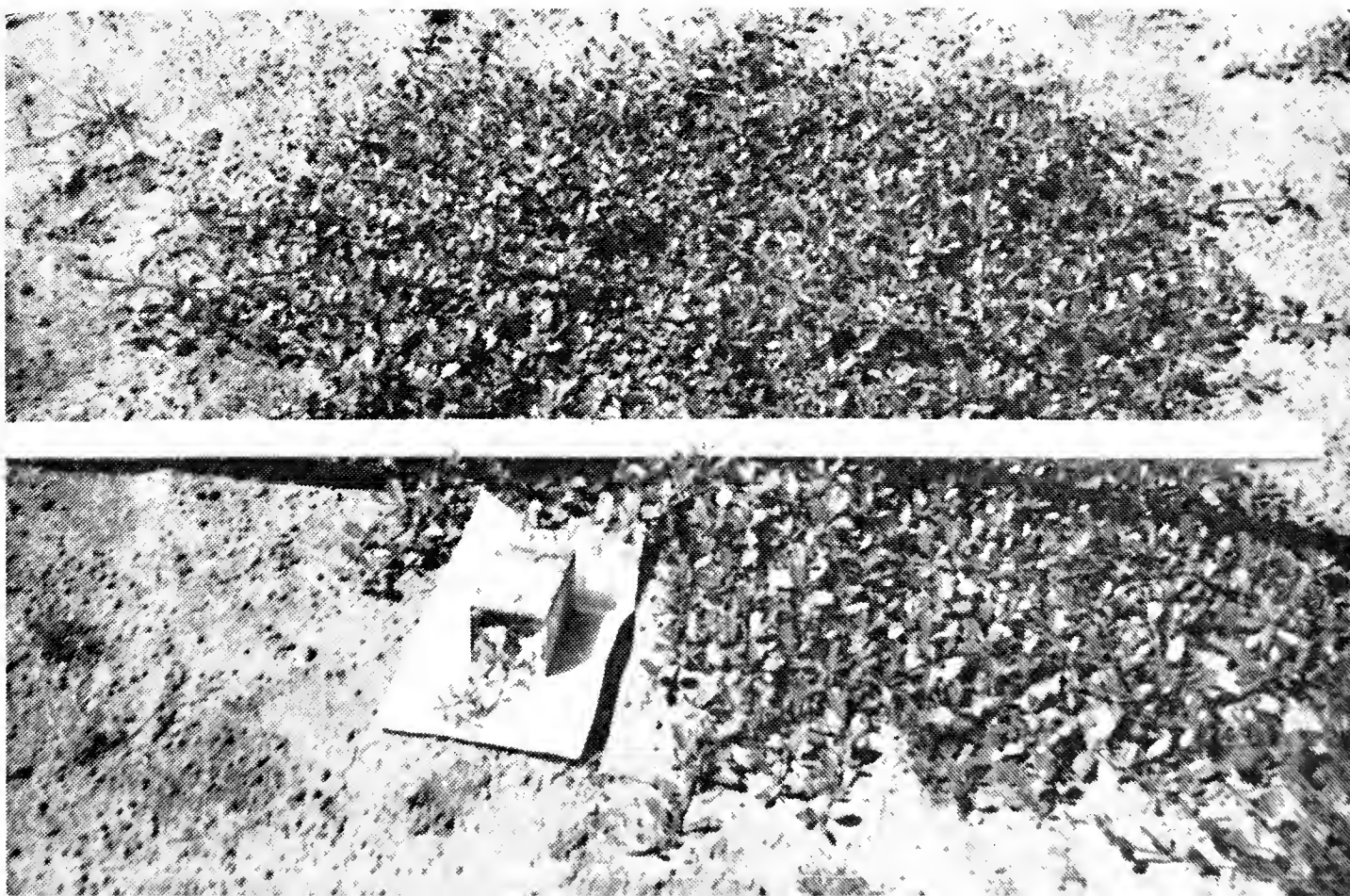
Three of the species, *C. cuneatus, C. prostratus,* and *C. pumilus* have their greatest usefulness as ground covers or rock garden plants. The habit of most forms of *C. cuneatus* is too sparse and straggly for them to be good garden plants, but some low-growing forms suitable for ground covers were found near O'Brien, Oregon. These plants, although they have not been observed in bloom, may be hybrid forms with *C. pumilus,* which grows in the same area. A few plants of these low-growing forms have been propagated and are under observation.

We have mostly worked with *C. prostratus.* It makes an attractive ground cover, as shown in the illustrations. The flowers are also attractive, particularly the white or darker lavender-blue. The seed pod, which looks almost too large for the plant, is red during the growing period before it matures and adds to the interest of the plant. Two features usually distinguish *C. prostratus* from *C. pumilus:* teeth along the margins of the leaves of the former, in contrast to three teeth at the apex of the leaf of the latter, and the large horns on the seed pod of *C. prostratus.* Some plants under favorable conditions have been observed to grow 12 to 18 inches annually, while other plants make 4 inches or less. The more rapid growing strains should be suitable as ground covers, while the slower types would be better in rock gardens. The ability to grow in low moisture, low fertility situations suggests it may be satisfactory for highway landscape plantings. Since the plants root at the nodes as they grow, soil stabilization on embankments should be another desirable feature of this plant.

C. pumilus is very similar to *C. prostratus* in appearance and uses. It has grown better at the University of Washington Arboretum than has *C. prostratus.* Since *C. pumilus* is found growing in the wild in wetter sites than is *C. prostratus,* it may be more adaptable to the humid conditions in Seattle than is *C. prostratus.* This might account for its better growth.

The height of *C. thyrsiflorus* varies from less than 2 feet to 20 feet tall, depending upon exposure to the wind. Some of the taller forms offer the possibility of developing into small, evergreen, blue-flowering trees. Such trees would be very useful landscape plants. This species is the hardiest of the tall, evergreen blue-flowered Ceanothus.

The hardiest of the evergreen species is the white-flowered *C. velutinus.* It is usually a wide-spreading bush which may be too vigorous for most small gardens. East of the Cascades, where low temperatures restrict the growing of many of the broad-leaved evergreen shrubs, it may be useful in landscape plantings. Plants for this area should be grown from seed collected in the colder part of its range rather than from the larger-growing western form.



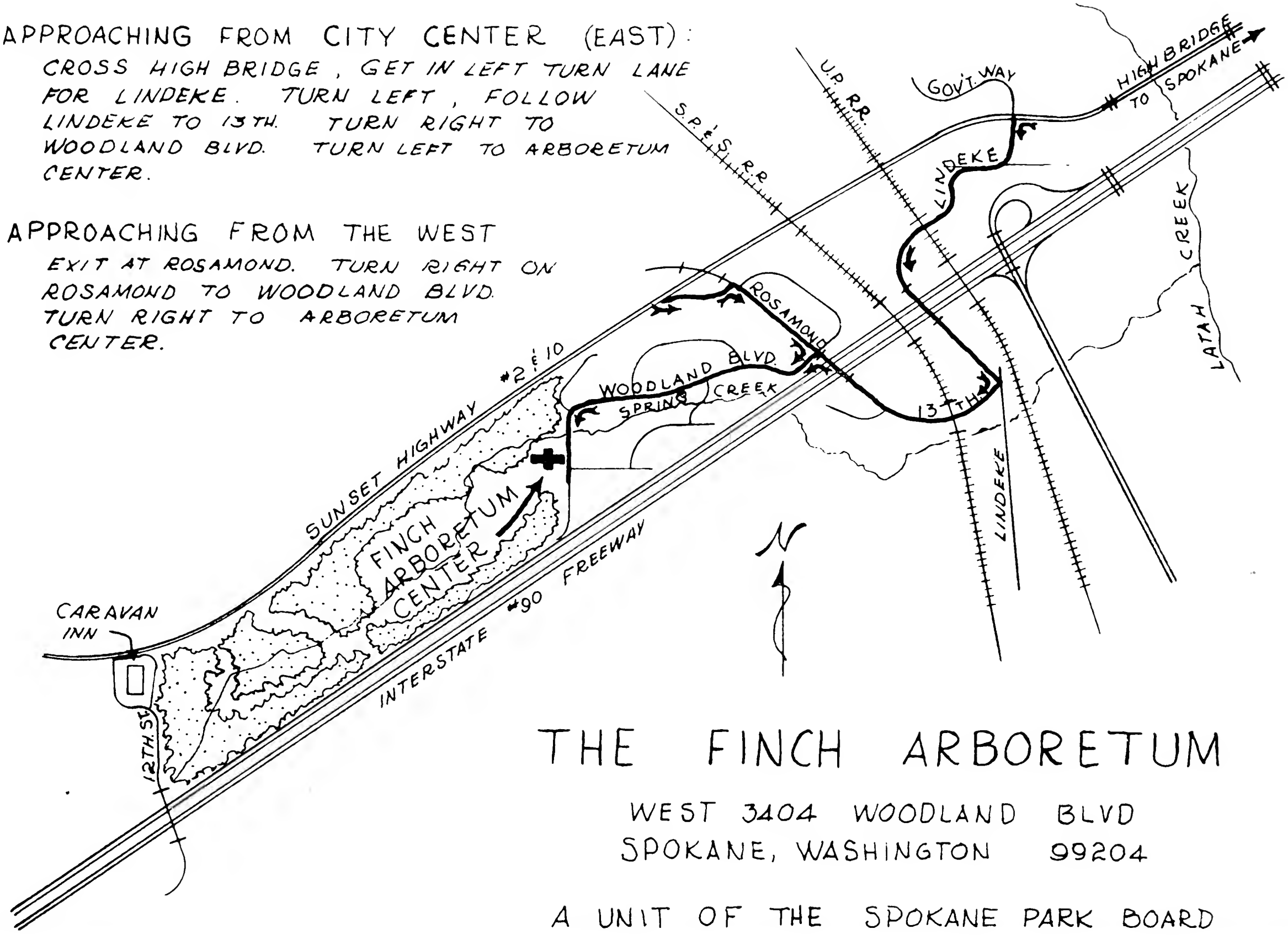
Growth produced by a plant of *C. prostratus* in three growing seasons at the No. Willamette Experiment Station from a banded cutting such as shown in the picture.

FIG. 8 PHOTO COURTESY: R. L. TICKNOR

TO REACH THE FINCH ARBORETUM

- APPROACHING FROM CITY CENTER (EAST):
  CROSS HIGH BRIDGE, GET IN LEFT TURN LANE FOR LINDEKE. TURN LEFT, FOLLOW LINDEKE TO 13TH. TURN RIGHT TO WOODLAND BLVD. TURN LEFT TO ARBORETUM CENTER.

- APPROACHING FROM THE WEST
  EXIT AT ROSAMOND. TURN RIGHT ON ROSAMOND TO WOODLAND BLVD. TURN RIGHT TO ARBORETUM CENTER.



THE FINCH ARBORETUM

WEST 3404 WOODLAND BLVD
SPOKANE, WASHINGTON 99204

A UNIT OF THE SPOKANE PARK BOARD

The John A. Finch Arboretum—Spokane, Washington

Wesley M. Clark*

HISTORICAL: The area which now comprises Spokane's John A. Finch Arboretum has always figured prominently in the development of this city. Garden Springs Creek, with its never failing supply of clear water, flows the year around through the center of it, and today serves as the backbone of the Arboretum.

Before 1872, when the first white settlement was established at Spokane Falls, Indian tepees were common along the banks of this little stream. As the white man encroached more and more, those scattered Indian dwellings disappeared, finally becoming a single small settlement near Indian Canyon, about one-half mile to the northwest. This, in turn, also disappeared, and for good, about 1915. One-fourth mile eastward, a brickyard sprang up to make use of the deposit of fine clay outcropping there, and which underlies much of this part of the state. Today, this "Old Brickyard" is gone, but it still is the source of our best fossils, or leaf imprints, dating back to Miocene times, circa 15,000,000 years.

The shallow defile through which Garden Springs Creek runs was for the Indian, and immediately became so for the white man, the principal artery of travel from "The Falls" to the west and southwest. This is still the case. Today, the Old Sunset Highway meanders along the western rocky edge of the arboretum. Some 100 feet or so eastward of this now abandoned thoroughfare, the new Sunset Highway, U.S. 10, cuts through the grounds, while on the eastern side of the arboretum, and slicing off more valuable property, the new Interstate Freeway #90 bores its straight-line course toward the heart of the city.

The inception of the Finch Arboretum dates back to 1907. In that year, Spokane's newly formed Park Board called in a firm of Boston architects to lay out an overall plan for the park system of the city. This plan called for a park, approximately one mile long, along Garden Springs Creek. Acquisition of land was begun immediately, and by 1940, some 67 acres had been acquired. Civilization then started to move in. The three highways, constructed in turn, replaced the old streetcar and interurban line. The war brought an airforce housing project into the area. All of this has whittled into the holdings, until today there remains only about 60 acres on which an integrated arboretum can be built. Part of this, lying between the first two highways, has no water and is, hence, unusable at present.

Most of the land of the Arboretum was owned originally by two men, Mr. D. H. Dwight and Mr. John A. Finch. The first of these, Mr. Dwight, envisaged a permanent home in the upper end of the grounds. Accordingly, he planted trees, e.g. maples, larch, spruce, white pine, and Douglas fir in the area, and made an access road and trails there. These trees today are the oldest plantings in the Arboretum. Mr. Dwight's plans, however, were not culminated and he sold his holdings to John A. Finch, who in turn sold the land to the city. Mr. Finch died in 1915, but in 1947, Mr. Wm. A. Corey, the executor of the Finch estate, established a trust fund of $250,000 to construct an arboretum which was to be called the John A. Finch Arboretum. Work began at once.

THE ARBORETUM TODAY: Having decided to build an arboretum, it was further decided to put it in a park-like setting, that is, covered with lawn. The first plantings were made in 1949. In that year, 49 specimens, comprising 10 genera and 23 species, were planted. Currently, there are representatives of 606 species and varieties included in 120 genera. Of the 1468 actual specimens growing in the Arboretum, 614 are trees and 874 are

*Arboretum Naturalist — Finch Arboretum, a facility of the Spokane Park Board.

FIG. 9 Map of the Finch Arboretum

shrubs. These do not include many native ponderosa pines and shrubs — *Philadelphus, Amelanchier, Crataegus, Sambucus, Prunus, Rosa, Salix, Betula, Cornus, Ribes, Physocarpus,* and others. Of the overall total of specimens planted, 132 trees and 161 shrubs, or a total of 293 (16.6%) have been lost due to many causes, e.g. severe winters (and occasionally summers), porcupines, vandalism, soil conditions, accidents, and unknown.

The 35 planted acres of the Finch Arboretum can be roughly separated into two parts. In the southwest end, the *Malus* and *Prunus* collections are in a basin. The soil is quite wet and somewhat shallow. Garden Springs Creek made a morass of this area originally, which is also underlain by basalt, hence of slow drainage. Some fill was made there during construction, but in seasons of much water, it remains saturated, often for long periods. Small losses occur there regularly. Most of the rest of the Arboretum is composed of varieties of river sands, deposited by innumerable streams formed by the melting of the continental ice sheet. Here, growth is often spotty. Severe summers, with accompanying relative humidities of below 10%, sometimes tax the watering capacities of men and equipment. The Arboretum slopes downward in a southwest to northeast direction. It is shielded from the prevailing southwest winds by the rimrocks which bound that end. This leaves it exposed to the bitter north winds in winter. Losses from the winter-kill therefore, have been sometimes of rather serious proportions. All in all, however, plantings are generally in good shape and show a moderate annual growth increment.

Sixty years ago the area through which Garden Spring Creek runs could be likened to a natural arboretum. The many trees and shrubs of that time have been reduced to a relatively few today. But scattered throughout the grounds are to be found many natural areas. These natural areas are all of basalt rock outcrops called "haystacks" by the geologists. They vary in size from a few feet in circumference to 200 to 300 feet. It is these natural areas, with their native vegetation, both herbaceous and woody, ringing the rock outcrops, that gives to the Finch Arboretum much of its distinctive charm. There, in the spring, can be seen the carpets of wild flowers that bloom in great profusion. There in summer and fall will be found the many kinds of berries so eagerly sought by the birds, and which makes of the Finch Arboretum an important bird sanctuary.

One such area bordering the shrub beds is our "Arboretum on the Rocks". Here, in a small space, are ten basalt "haystacks" of different sizes with a granite erratic of glacier origin thrown in for good measure. Growing out of these solid rocks can be counted 26 trees of birch, alder, willow, poplar, black locust, maple, and dogwood. Other "haystacks" of the Arboretum also support varied growths, as for example, one with a ponderosa pine 60 feet high and trunk base of 20 inches in diameter. On many of these rocks also, lush growths of mosses, lichens, ferns, and many annuals and perennials persist.

For the first ten years of operation of the Arboretum, accession numbers were made cumulative. This soon became unwieldy and was therefore changed in 1958. Now, the accession numbers start with number 1 for each year. This number, the botanical name of the plant, the year planted, and its source were printed on a metal strip which was hung by wire on the plant. Losses of these strips through vandalism, breaking of the wires, and occasional dying of the limb to which fastened, gave constant trouble. Besides, it is often difficult to find and read the dull six-inch by one-inch strips on a bushy tree or shrub. A new system was introduced. In this, a cement block twelve by seven by four inches is labeled with a black plastic card engraved in white with all pertinent information. The plastics are cemented to the sloping top of the blocks, which are then buried at the base of the specimens, leaving only the upper three inches above ground.

This, then, is Spokane's John A. Finch Arboretum — a botanical type arboretum "of trees and shrubs in a park-like setting".

Landscaping Scientific Research Center and Developmental Center at The Boeing Company

RAYMOND PRENTICE*

THE growing trend toward the landscaping of industrial plants and commercial buildings is gratifying to the landscape and nursery industry, as well as the business personnel and general public. The plantings of The Boeing Company is an example of what can be done in the field of commercial landscaping, accomplishing a three-fold purpose of complementing the architecture, creating a place of beauty, and providing more in the way of pleasant working surroundings.

The Boeing Company has been interested in making their newer facilities reflect the care and design that go into the airplanes they produce, as well as create a campus-type atmosphere. Their landscaping was done in stages, beginning with a cafeteria planting and an entrance memorial to Mr. William E. Boeing, Sr. at the Developmental Center, followed by plantings at the Scientific Research Center in South Park and an additional large project at the Developmental Center. Work was also done at the Plant 1 parking lot, the Computer Center, and the Primary Standards Building near the Research Center. This landscaping program was developed over a period of some six years. We were selected to do this work because of our experience in industrial landscaping.

The first project we did, landscaping the Developmental cafeteria and the entrance memorial, was highly successful. A large patio at the cafeteria was landscaped to provide a place where personnel could take box lunches to eat, weather permitting. This initial landscaping program was so popular that it was carried on further in other areas.

The next landscape project was done at the Scientific Research Center, located atop a rock hill in South Park, overlooking the surrounding Duwamish Valley. The planted area totaled approximately two acres. The Boeing Company was fortunate to have a man in charge of this project who had a keen interest in plant material and the foresight to know what a well landscaped project could do to create an inspiring atmosphere. The creation of a campus-type atmosphere would perhaps help to attract top scientists, who probably were more sensitive than many to this type of surroundings, from all over the world to work at this center.

A large auxiliary, blacktopped parking lot created a specific problem. Each laboratory in the building faced outward and looked onto a sea of asphalt. Plant material had to be placed in such a way as to enhance the architecture of the building and to establish some greenery to break the view of the paving, which was impossible to hide. Another problem of major consideration was that the laboratory was built on a hill of solid rock. This was convenient so that the scientific instruments would record more accurately, as the surrounding area of the Duwamish Valley is a floating mass of silt, which shakes and vibrates whenever a truck or train passes. All of the planting beds, therefore, had to be either mounded up or the rock had to be excavated in the bedding areas and replaced with soil. Where excavation was done at lower elevations there had to be adequate drainage. Even the patch of lawn had to have a foot of soil because of the layer of underlying rock just below it. It had to be contoured so that when water went through the top soil and hit the rock layer, it would drain away. Had this area not been drained, good top soil would have turned into sour soil that most likely would not have raised a "disturbance." The top soil needed amounted to thousands of yards. Fortunately, there was sandy hill soil nearby, which had at one time been old garden plots.

As the Research building runs east and

*We are most pleased to bring you an account of recent plantings from Mr. Prentice of the Prentice Nursery & Decorating Company, well known for their operations in this field for many years.

west, the major portion of the planting would be exposed to the sunlight of the south and the full windy conditions that prevail from being exposed on a high, barren hill. This was taken into consideration in the choice of planting material. A theme was established and developed using rhododendrons and oaks, which go very well together, along with junipers, which are hardy and go well with the textures and foliage of other items. In one part of the planting, the oaks were used for shade and height and rhododendrons of six to eight feet were used beneath them. Junipers were used as a ground cover at the feet of the rhododendrons to tie the planting to the ground. For accent, one thirty-five-foot pyramidal clump birch, several twenty-foot pines and several thirty-foot vine maple were planted.

There was a basic simplicity of design in the few varieties of material used. For example, there were five pin oaks on an acre of lawn in one location. More detail was used to accent the entrance. The large birch was placed as a specimen in a group of rocks, with four or five dwarf rhododendrons and some potentilla in the background for summer color. The birch and rhododendrons were complemented by low growing material, such as springwood white heather, a reddish-blue foliaged white sedum, and variegated ajuga in shady locations.

In examining the blooming periods of the plants, the heather flowers sometime in January through March, the rhododendrons bloom in April and May, and the potentilla displays its golden color from May through October. The birch colors in the fall, and sedum and variegated ajuga give foliage color contrast the year around.

The next major Boeing project we did was landscaping the addition to the Developmental Center. This Developmental Center is

Taken from inside the cafeteria looking out the window onto groups of alpine fir, rhododendrons and pin oak—illustrating the importance of the landscaping as viewed from the interior.

FIG. 10 PHOTO BY: STUART B. HERTZ

one of the largest complexes of office buildings belonging to one firm, in one location, west of the Mississippi River. This addition included two buildings, four hundred and fifty feet long, running east and west, and a third building, six hundred feet long, running north and south, and connected with the first by glassed-in passageways. In the middle of this U-shaped grouping is a cafeteria and the open end a depressed parking lot. As the entrance is through the parking lot, it had to be screened from the industrial part of Boeing to the east. The screening was accomplished by groupings of large moraine locust, which were underplanted with rhododendrons and accented with pine and groups of tall stately noble fir. The balance of the U-shaped area between the buildings and cafeteria was either landscaped or had sidewalks for pedestrian traffic.

Large plant material in the twenty- to thirty-five-foot sizes used in this area included birch, oaks, pines and vine maples, underplanted with rhododendrons and azaleas. On the north side, where shade conditions required it, skimmia, Oregon grape, vine maple and alpine fir were used. The sidewalk and buildings were separated with rectangular patches of lawn. As grass would not do well close to the buildings on the north side and protruding, upright beams would have made mowing difficult, we placed a five-foot strip of two and one-half inch gravel between the building and the lawn, to simplify maintenance. After the accent points were located and planted, groupings of rocks, alpines and ground covers were placed in the gravel strips.

The rock outcroppings were selected from collected mountain stone, which had a whitish gray appearance that complemented the precast stone panels used on the buildings. Additional plantings were located at strategic

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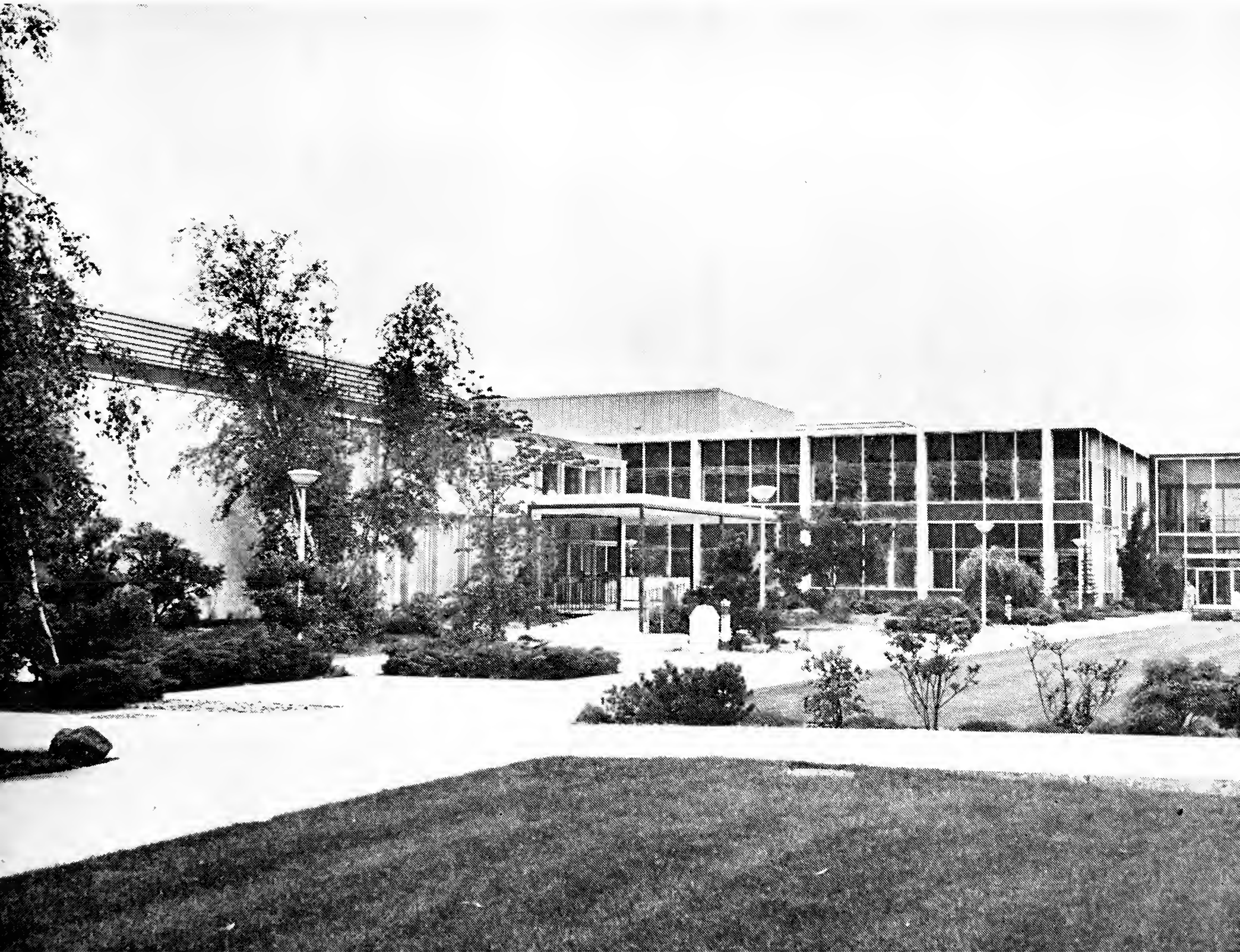
Showing relationship of the sidewalks connecting the buildings and patio to the plantings.

FIG. 11 PHOTO BY: STUART B. HERTZ



Every Garden Needs a Cold Frame

ESTHER BERRY*

THE encyclopedia defines a cold frame as a bottomless, box-like structure with a removable top, glazed with glass or other transparent material, used for protecting, propagating and growing plants. It is that and so much more!

It is tulips blooming on my window sill in February, it is a woodland path lined with all sorts of ferns and fuchsias and primroses, it is a midsummer border ablaze with color, it is new and strange little alpines tucked among the rocks, it is tiny trees and shrubs growing in neat rows. It is all the seed catalogues of the world in living color. I am no longer limited to the plants that are commercially available. Every seed catalogue offers exciting adventure and I search them eagerly for the beautiful things I see featured in horticultural publications. I do not always succeed with these but I learn a little with each failure — mostly patience. There is a real thrill in growing my own plants, even when they are old favorites getting off to an early start.

The only limit upon the usefulness of the cold frame is its size, no matter how small the garden or how large the frame, it will never be large enough. In a small garden where a greenhouse would not be practical, a heated frame is an excellent substitute; I believe it is superior in many ways. Heat, light and ventilation are more manageable in a frame. It provides growing space at a fraction of the cost of the same space in a greenhouse. With more than one frame there is the additional advantage of being able to provide optimum growing conditions for plants with different cultural requirements.

The first step in building a frame is the selection of a site, ideally it should face south or southwest but any spot where the light is good will suffice. A garden frame can be simply an excavation in the earth, covered with a sash, or it can be a handsome structure made of bricks or cement, or anything in between. Two-inch cedar makes a good serviceable box for most purposes; it is not so expensive as masonry and retains heat somewhat better. An unheated frame is useful in many ways but if electrical current is available, it would greatly increase the value of the frame to install a soil cable and a thermometer.

The next consideration is the sash. If the frame is to be a simple structure for winter protection, then an old window frame will do nicely. On the other hand if it is to be a permanent structure with ambitions, then you will want greenhouse glass and a sash made to fit your situation. If the sash is left unattached, it can be ventilated on the side which is away from the wind, in this way allowing maximum ventilation while still giving protection.

The floor of the frame should be covered with three inches of sand to promote good drainage. If the frame is to be heated, the soil cable should be placed on top of the sand and covered with hardware cloth. This is then covered with an additional two inches of sand and the frame is ready for service.

Perhaps the most generally useful function of the cold frame would be the propagation of plants from seed. This is neither difficult nor complicated but it is necessary to give it the time and attention that is required. The first order of business must be absolute cleanliness or there will be diseases unnumbered. A thorough scrubbing with soap and clorox, two or three times a year, and an occasional coat of whitewash should be adequate for the frame itself. All the seed pans, flats and crocks must be scrubbed with the clorox solution also. I like shallow seed pans best; it seems to me that deep containers are likely to become sour if the seed does not germinate quickly. The small plastic baskets in which

*Our Mrs. (Robert) Berry of the Editorial Staff is an ardent and devoted exponent of this particular technique.

bedding plants are often sold are excellent for this purpose.

Once the box and the containers are prepared, the next decision will be the seeding medium. While it is true that some seeds do have very specific requirements which must be considered if they are to prosper, most are not so demanding. I have had reasonable success with most things I have tried by using a mixture of one-third sand and two-thirds peat moss. I dampen this mixture thoroughly and then sterilize it by placing it in a covered pan in a 200-degree oven for 30 minutes. I have had little difficulty with damping since adopting this procedure.

The mistake I make most often is that of sowing too thickly. It takes great strength of character to leave a portion of the seed in the packet. The exercise of a little restraint here will pay large dividends later on. If the seed is sown thinly, the seedlings will have a good chance to grow hard and firm. If they are too thick, they will be soft and weak. There is an extra advantage in that you will have a second chance with the remaining seed if the first sowing should fail — as it sometimes does.

It is a general rule that seed should be covered to the same depth as the thickness of the seed, very fine seed need not be covered at all. It goes without saying that, once sown, the seed must be kept constantly moist; always remember that each seed is a living organism just coming to life, it must have the right conditions to survive until it can draw nourishment from the soil. Since my soil mixture has little nutrient value, I water the young seedlings with a dilute solution of Rapid Grow or Hyponex. When seed is likely to take some time to germinate, the seed pan may be covered with a piece of glass. If this is done the glass must be turned every day. As soon as germination occurs, the glass should be removed to give maximum light and air. While the plants are small they can be severely damaged by direct sunlight so some shading will be necessary on bright days. This can be done easily by cutting a lattice pattern from a square of white muslin, which can be secured to the sash with thumb tacks. This can be varied to provide exactly the right amount of light.

As soon as the young seedlings are established, they will need to be pricked off into flats or pots. If they are growing too thickly, they must be taken at the earliest possible moment. There are some that will not like this but if you leave them they will become drawn by their struggle for light and air. If this has happened, you will be tempted, at transplanting time, to set them a little deeper than they were in the seed pan. This will only compound your felony for the risk of damping, already great, will be increased. Immediately after transplanting, the frame should be kept closed for a few days. As soon as they have recovered, ventilation should be increased as rapidly as the weather permits. At this stage you should maintain constant vigilance for slugs. They love the cozy warmth of the cold frame and the succulent young plants.

I have only limited experience in the cultivation of alpines but I have discovered that they need a little more care than most things. They do not suffer from the cold but many cannot tolerate our wet winters. To grow them successfully, the cold frame is indispensable. They need a gritty seeding medium; I have used a sterile mixture of two-thirds sand and one-third peat moss with fair success. Many of the alpines will germinate more readily if they are stratified. A simple way to do this is to sow the seed in the usual manner and then put the small seed pan inside a plastic bag and put it into the refrigerator. The length of time needed for process will vary. Primula, Gentiana and Meconopsis have germinated well after being partially frozen for ten days.

There is yet another area where the cold frame is really necessary. There is a great variety of very ornamental ferns that are all but unknown here. Very few are available commercially. They can be grown perfectly in a garden frame. Most of the ornamental ferns come rather slowly, requiring consider-

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The Conservation Forum

A. R. KRUCKEBERG*

EDITOR'S COMMENT: The combination of increased leisure time, an enlightened citizenry, and the unusual gardening potential of the Puget Sound Region all have created a heightened interest in the University of Washington Arboretum in recent years. We believe that many Arboretum patrons live in the Pacific Northwest because of the unparalleled natural grandeur and beauty of our state. The same motivations that lead to avid gardening lead to outdoors recreation and the appreciation of wild nature. Preservation of our natural bounty then becomes a matter of concern for all of us. Your Editorial Board therefore wishes to let this section of the BULLETIN be a periodic sounding board for the exchange of ideas throughout the state in the field of conservation. We hereby solicit literary contributions to this "Conservation Forum".

THE WASHINGTON CHAPTER OF NATURE CONSERVANCY

FRIENDS of our Arboretum know from experience that conservation of wild life and open space demands a day-to-day vigil. Nesting grounds of swamp-loving birds, wild areas of natural vegetation and other tracts of land in and around the Arboretum have yielded to pavement, in recent years, but through the vigilance of many of us the losses have so far been kept to a minimum. Constant threat to irreplaceable natural areas is a grim reality all over the United States. Organized and individual resistance to "progress" through destruction has taken the form of action by conservation groups throughout the country—trying to stem the tide. One national organization—Nature Conservancy—has quietly engaged in nature conservation for nearly twenty years. Not to be confused with its British namesake—a government organization akin to our National Park Service—our American Nature Conservancy is a private organization which acquires and preserves the bits of wild nature still remaining in the United States. Nature Conservancy puts highest priority on those samples of wilderness that contain unique natural phenomena (rare species of plants or animals, unique biotic communities, unusual geological formations, etc.). In so doing Nature Conservancy puts highest values on the educational and scientific worth of such acquisitions. It foresees tracts of wild nature set apart from recreational use, but still available for restrained study and research. Keeping the wild *status quo* of such preserves is an essential element of Nature Conservancy philosophy.

It has only been since 1960 that Nature Conservancy has had a Washington State Chapter; its small but growing membership and quietly aggressive directorship have made modest accomplishments. Two samples of Western Washington plant communities have been acquired (The Deering Preserve near Marysville and the Swan Creek site in Tacoma). The Chapter's Scientific Advisory Committee, made up of biologists around the State, compiled an impressive inventory of natural areas throughout the State that merit preservation. Several of the tracts uncovered by the inventory are now active projects for the Chapter.

How urgent is the need for the type of conservation espoused by Nature Conservancy? The conservation outlook in Washington State probably is representative of the less populous states in the West. Enough of wild nature has not been irretrievably lost or destroyed to alarm the public. The vast tracts of land under state and federal jurisdiction still contain parcels of relatively undisturbed wild lands. Moreover, certain of these lands are not as yet considered exploitable or are still in partially protected status under National Park, U.S. Forest Service and State Forest control. Still other large areas are privately owned by timber, mining, and other interests, either to be exploited in the future or maintained on a sustained yield pattern of use. All these assured "safeguards" against drastic alteration of natural areas tend to inhibit a spirit of urgency about conservation. Only a few individuals and groups are

*Assistant professor, Department of Botany, University of Washington.

alarmed at the constant inroads made on wild areas; most other users still see the State as a "last outpost of wilderness" in the West.

It cannot be denied that a fair proportion of those wild areas under certain governmental and even private control are still protected—either in the active sense, or in the sense that they just have not yet been severely tampered with. However lulling may be our apparent margin of safety against loss of wild areas, every year sees the progressive attrition of these vast natural preserves, some of which are truly unique. Nature Conservancy takes the stand in Washington State that action is needed both to maintain a militant watch on quasi-protected and protected wild lands and as well to act on critical sites where the danger of their being destroyed is more imminent.

The kinds of natural areas needing most urgent conservation action are tracts under private ownership on both sides of the Cascades. In the Puget Sound lowlands Man has exerted the greatest irreversible influences. Tree farms, metropolitan areas and their satellite suburbias, plus small farmland tracts, have nearly erased the picture of magnificent primeval forest seen by Captain Vancouver and the early settlers. Bits of fir-spruce-hemlock-cedar forests, especially urban areas, should be set aside as living museums for educational and scientific purposes. This same Western Washington country was, of course, not all forested. Through glacial action the lowland topography was altered to create gravelly prairies, Mima mound microrelief, peat bogs and lakes. Samples of these and other usual topographic-biological communities should also be preserved especially near our rapidly growing urban areas.

Much of the private and governmental land east of the Cascades, though not directly under the acute pressure of population increase, are yearly converted from their native state to farm land or locked up as governmental preserves or are giving way to other man-made pressures. Only a moment's reflection on the diversity of natural habitats in Eastern Washington will yield a substantial random selection of sites needing preservation; a bunch-grass prairie, "scab-land" wild flower areas—a "pot-hole" lake—a bit of basalt rim-rock, sage brush prairie, a coulee, etc. . . .

Within the mountainous areas of the State we will continue to expect wise government protection of natural areas but we must also remember that (1) not all mountainous lands are under governmental control (many are owned as railroad lands, private timber and mining preserves, etc.), and (2) government lands may be utilized in ways incompatible with the preservation of unique tracts of wild nature.

The activities of Nature Conservancy fill a unique niche in the sphere of conservation activities in the State. Nature reserves acquired by Nature Conservancy are to be used for scientific, educational and aesthetic purposes. As such, they do not compete with the recreation function of other types of nature preserves (parks, campgrounds, etc.) which are acquired by other organizations. Nature Conservancy seek to "preserve or aid in the preservation of all types of wild nature, including natural areas, features, objects, flora and fauna, and biotic communities." Size of preserves may vary from only a few acres, as the 11 acres in Snohomish County, up to the 6,500 acres Northern California Coast Range Preserve.

Effective pursuit of Nature Conservancy goals requires an organization of enthusiastic and influential citizens who can devote time and energies to conservation work. The enterprise needs all sorts of inspired individuals: lawyers, teachers, business leaders, scientists, and other professional men and women; it needs those with special skills (secretarial, real estate, tax experts, etc.), and simply those who have the desire and time to work in the Nature Conservancy effort in Washington. Though Nature Conservancy is always on the alert for new acquisitions, it is the membership and other friends of wild nature that often bring to the attention of

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Some Notes on the Mountain Flora of Vancouver Island

E. J. GREIG*

THE purpose of these notes is to describe briefly some of the more noticeable forms of plant life which can be found in the mountain areas of Vancouver Island. The writer has roamed these hills for the past 45 years, and so has at least a bowing acquaintance with plants as seen during expeditions into all the better known areas, as well as to parts at one time inaccessible except by doing it the hard way. With more access roads and travel by air becoming more easily available, the difficulties are now not nearly as great as they once were.

This Island is some three hundred miles in length and approximately fifty miles in width throughout its central part. It lies about north-west by south-east. The central portion contains the highest mountain areas, though none of these greatly exceed 7000 feet in altitude. To the north the mountains seldom are higher than 3500 to 4000 feet, except for a few isolated peaks, while the southern end of the Island has few mountains which are greater than 3000 feet, consequently until one gets into the Cowichan Valley area few of the peaks are sufficiently high to retain snow throughout the summer months.

The higher peaks and ranges are therefore contained in an area of less than 150 miles, and these mainly in the Qualicum-Alberni districts and in the Comox-Sayward areas, which last includes the wilderness area known as Strathcona Park.

The main backbone range of mountains has, as one can imagine, a modifying effect on the climate of this Island, particularly in regard to precipitation. The west coast, being fully exposed to the open Pacific, has an average of more than twice the rainfall of the eastern side. The eastern slopes of the central range, in the Comox District, average 60 inches per year, the western slopes well over 100. As a contrast, the Victoria rainfall is in the neighborhood of 30 inches or less.

As far as the writer is aware, the geology of the mountain areas is not too dissimilar to other nearby areas in the Pacific Northwest. Many of the higher peaks are composed almost entirely of volcanic rocks—notably Mt. Albert Edward and Mt. Foster. The more recent sedimentary rocks are found in isolated areas. Such limestone as occurs is of a hard crystalline form, and has little or no effect on the flora. The writer has not personally observed in these mountains any areas of serpentine, the occurrence of which normally has a marked effect on growth thereon.

Snowfall is heavy, particularly in the eastern ranges—the western side, as previously remarked, has greater precipitation but more in the form of rain. Permanent snowfields occur in all areas from 6000 feet up, and in a late season the snow still covers the slopes until late June or early July as low as 4000 feet. Such conditions naturally have a marked effect on the type of growth. For example, the majority of the trees are of small size, and have short, bushy branches characteristic of trees growing in regions of heavy snowfall.

Moreover, the trees and shrubs growing on hillsides have their main trunks bent sharply downhill just above the ground level. This elbowed appearance is very striking on most steep slopes, and is of course induced by snow pressure. Such conditions can be observed in other areas in the Pacific Northwest, but are generally much more noticeable here and in comparable areas of the mainland Coast range.

The life zones are distinguished largely by the climatic conditions resulting from altitudinal differences. These zones are not separated by level lines; various physical conditions and other factors such as aspect, char-

*Owner of the Royston Nursery, Vancouver, B. C.

acter of soil, and even ancestry, having a bearing on the growth. The eastern side of this Island has its climatic conditions largely modified by the fact that the deep inlets leading down into the gulf through the mainland mountains act as troughs which funnel cold air across to us during the winter from the northeastern interior. This is counteracted to some extent by somewhat similar troughs crossing the Island—the Barkley Sound, Alberni and Qualicum Gap is one example; another is the Nitinant—Cowichan Lake and Valley area to the south.

Here on the lower slopes at around 4000 feet we find the Transition zone merging into the Canadian zone. Dominant trees are mountain hemlock *(Tsuga mertensiana),* yellow cedar *(Chamaecyparis nootkatensis),* white pine *(Pinus monticola),* and our two mountain firs *(Abies amabilis* and *lasiocarpa).* The dominant shrubs include rhododendron *(R. albiflorum)* and several species of *Vaccinium.*

Here the Hudsonian zone is a comparatively narrow belt of dwarfed hemlock, yellow cedar and juniper in the region of timberline, at approximately 5000 feet elevation. Ground cover consists of *Cassiope* and *Phyllodoce* (in great quantity), teaberry *(Gaultheria ovatifolia),* dwarf *Vaccinium,* several species of *Lycopodium,* and mats of *Leptarrhena pyrolifolia* in wet spots.

The treeless Arctic-Alpine zone on mountain-tops has of course its own distinctive South-facing talus slopes are usually the most colorful, with an abundance of *Phlox Diffusa, Penstemon, Luetkea pectinata* with a sprinkling of various *Saxifrages, Erigerons* and *Arenaria.* Here, with their toes in ice-water, are colonies of *Saxifraga Tolimei,* as can be seen under similar conditions up and down the length of the Coast and Cascade ranges. Plants preferring more stable conditions, and usually anchored into crevices and rock faces, are a number of Ferns, such as *Asplenium trichomanes* and *viride,* the Parsley Fern *(Cryptogramma crispa), Cystopteris fragilis, Polypodium vulgare* in an alpine form, tucked into the tightest crevices; and the writer has even occasionally found the odd plant of *Polystichum lonchis* at very high elevations, though normally much more abundant in north-facing rubble slopes at 5 to 6 thousand feet. Other crevice plants of the high tops are *Silene acaulis* (in some areas here with a high proportion of white-flowered forms); *Lewisia Columbiana,* and *Sedums.* We have a dearth of *Liliacae* at our higher altitudes, that is as far as any great show of bloom is concerned. Nowhere on the Island do we have the mass displays such as can be seen in many other comparable areas near the Pacific Coast. We do not have *Erythronium montanum* at all on the Island, and the colonies of *E. grandiflorum* occur in scattered and isolated areas. The *Alliums* include *cernuum* and *acuminatum.* The *Tofieldias* occasionally stray to the higher areas, but are not common above the alpine meadows. Our rarest *Liliaceaous* plant is undoubtedly *Lloydia serotina,* which I have found twice only in high cols at over 6500 feet. So far as I know, these are the only records for Vancouver Island.

I have always maintained that, probably largely through soil and climatic conditions, the welter of Ericaceous plants on Vancouver Island has tended to smother or inhibit the growth of many other perhaps more interesting plants. For instance, we have but few representatives of the *Primula* family. In coastal areas *Dodecatheons latifolium* and *pauciflorum* are common and widespread. In alpine meadows at or near timberline the rills and boggy spots are colorful in August with *D. Jeffreyi,* but the only *Dodecatheon* with any aspirations to being a high alpine plant is a distinct form of *D. pauciflorum* which never exceed 3 to 4 inches in height, usually less. There is an isolated colony of this on Mt. Arrowsmith. I have not seen this elsewhere on Vancouver Island. Our rarest member of the *Primulacae* is most certainly our Vancouver Island form of *Douglasia laevigata.* I first saw this growing while climbing a precipitous cliff face in the Elk River Valley of Strathcona Park many years ago. The plant was not in bloom, but I

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Gardens and Fertilizers in Western Washington
Part II

S. P. GESSEL*

AN introductory discussion in the last issue set the stage for this treatment of specific elemental problems which may be encountered in gardening. Generalities regarding soil, plants, and fertilizer were set forth with the hope that specific elements could be discussed in this and forthcoming issues. Even with the extra space, a limit will have to be imposed. The plan will be to list the elements according to general amount used by plants and then discuss plant needs, natural source of supply, fertilizer forms, and general garden management to conserve supplies for each element.

Elements Needed in Large Amounts (Often Called Macro-Elements)

Nitrogen:

Without sufficient nitrogen, plants are generally yellow in color and stunted in growth. Roots and tops are both affected. Air is 4/5 nitrogen gas, but this must be combined with other elements (fixed) to be used by plants. This progresss may occur biologically by bacteria or other small organisms, or chemically. Some plants have ability to carry out this fixation process by associating with nitrogen-fixing organisms. Plants in the legume family are notable for this, but others such as our own native red alder also can. These plants, of course, are especially important in nitrogen supply conservation.

Unlike other elements, nitrogen usually is not a component of mineral material making up the major part of soil. It is, on the other hand, a constituent of organic matter, and the natural supply for plants comes from the decomposition of organic matter. Therefore, soils without organic matter are also usually without nitrogen. The mere presence of organic matter does not insure sufficient nitrogen, though, as quality of organic matter is also an important factor. Nitrogen must be continually released from organic matter to plants by decomposition and subsequent chemical changes. If this does not occur, nitrogen deficiency can result even in high organic matter soils. An important factor in this cycle is the amount of nitrogen in the organic matter and the rate of decomposition. Temperature and water supply are also controlling factors.

It should be apparent that proper supply of nitrogen in garden soils is a complex biological and chemical problem and is subject to wide fluctuations. However, the supply is certainly subject to management by the gardener. Organic matter is one key to nitrogen and hence the compost pile is important. Lawn clippings and leaves contain valuable nitrogen but, strangely enough, many people throw or give these away.

In terms of commercial fertilizer sources, nitrogen is also different in that all ordinary forms are readily soluble and quickly available for plants. Some slowly available forms are now being manufactured. Therefore, response to application is very rapid, but because of quick and heavy use or loss from the soil system, the overall response to a particular application is not permanent. Common forms of nitrogen are ammonium sulfate, urea, and ammonium phosphate. These differ in amounts of elemental nitrogen present (ranging from 15 to 45 percent), and as this is what a gardener is purchasing, the nitrogen content should be examined in relation to the price.

A final comment on danger in use is appropriate. Nitrogen fertilizers are usually quite soluble and, if applied directly to plants, can cause damage unless water also is applied. I have seen many brown lawns from wrong use of nitrogen fertilizer, when correct use would have produced an eye-pleasing green. Either tops or roots of plants can be killed by strong nitrogen fertilizers.

*Dr. Gessel's discussions began with Part I in the Fall issue of THE BULLETIN.

Nitrogen is frequently deficient in many northwest soils, and nitrogen deficiency is the cause of many poor, yellow lawns. Soil supply can be easily and markedly changed by addition of commercial forms. Soil organic matter can also be readily changed, this changing nitrogen supply. With these many possibilities at hand, there is no reason for any garden plants to suffer from lack of nitrogen if the gardener is observant and interested.

Phosphorus:

In contrast to nitrogen, phosphorus-deficient plants may be purplish in color, especially new leaves and growing areas. Phosphorus is not needed in such large amounts by most plants as nitrogen, but deficiency can show up just as readily and be as serious with growth being materially reduced.

Phosphorus is found in many minerals which make up the inorganic skeleton of soil so the major source of supply is inherited from the soil parent materials. The element is also component of organic material in the soil but the amount in this form is frequently small.

Phosphorus supply to plants from the soil system is complicated by the fact that not all that is present in the soil can be used by plants. In other words, it is an element which exists over a rather wide range of availability. This is largely determined by the form in which it occurs in the soil but is, also, partly dependent upon the plant species and different plants do have different abilities to take phosphorus from a given soil. For example, our common forest tree, Douglas fir, seldom suffers phosphorus deficiency on our upland soils but tomato plants could not be successfully grown on the same soil without phosphorus addition. This ability to extract phosphorus by some plants seems to be related to a fungus which grows in association with some plant root systems.

Some types of soils also have a very pronounced ability to take soluble phosphorus and convert to more insoluble or fixed forms. Many of our Northwest soils are notorious for this. This means that even if phosphorus is added to the surface of a soil very little of it will end up within a plant, as it is very strongly retained within the soil. One has to then resort to the practice of putting the phosphorus near the root systems of the developing plant. This is called fertilizer placement.

Phosphorus is sold in a variety of forms usually associated with calcium and having widely varying percentages of elemental phosphorus. The content may be either expressed as elemental phosphorus(P) or as P_2O_5 the oxide form. In either case the buyer should know that the available elemental composition is the important point to consider. These fertilizers are commonly called phosphates or superphosphates. A popular and very useful fertilizer in our gardens is a nitrogen-phosphorus combination called ammonium phosphate and commonly sold as 16-20 or 16% nitrogen and 20% phosphorus.

Potassium:

This is an element needed in amounts approaching that of nitrogen. Deficiency symptoms include chlorosis of leaves, particularly older leaves. Potassium is quite mobile in plants and younger growing tissue can drain potassium from older tissue resulting in the deficiency showing more markedly in older tissue. The overall deficiency frequently resembles nitrogen and generally results in stunted growth.

Potassium is also a component of the rock and mineral patent material of soils. Consequently basic potassium supply is largely determined by the geology of the area. Soils from quartz sands may be very low in potassium while soils from more diversified materials as water or ice-borne mixture have less chance of being potassium poor.

Potassium is used in large amounts, though, and continual vigorous plant growth and harvest may bring about deficiency in even originally well supplied soils. The element is also easily removed from plant tissue and can readily be leached out by rain water. Therefore, it may be low in many organic

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Controlling Garden Insects

H. J. Heikkenen*

INSECTS frequently present gardeners with major problems. Initial attempts to understand garden insect troubles usually meet with frustration. There appear to be as many books on insects as there are insect species, and insecticides are feared rather than respected. In this article I would like to present an approach to insect control that will prevent minor pest problems and gain time in which to solve major insect troubles.

Early Detection

The problems of insect pests in home gardens can best be prevented by early detection and prompt action. This suggestion is based on the premise that a few are easier and cheaper to control than many. But the major stumbling block to early detection is a knowledge of the appearance of a healthy plant.

The first evidence of insect attack is usually damaged plant tissue. Holes appear overnight in the leaves, or yellow spots develop on the stems. Frankly, the responsible insect pests are seldom seen. Many major pests inhabit the soil; others insert their eggs within the plant without leaving a sign of their activities; and the hours we spend in the garden do not often coincide with the feeding times of many insects. Few pests are active during the warm, sunny hours of the afternoon—their moisture retention problems are too severe.

When insects initially attack a plant, damage may be very slight and located in rather secretive places from our standpoint. The newly hatched larvae are extremely small and vulnerable to desiccation. Their feeding preferences are mainly soft succulent tissues in well-sheltered, moist places.

The early detection of insect pests necessitates close and constant examination of newly expanding shoots, buds, and leaves. The gardener should not expect to find the insect, but rather watch for signs of insect feeding.

*Dr. Heikkenen is assistant professor of Forest Entomology, University of Washington.

Pest Identification

The ability to control an insect pest does not demand a correct identification down to the species. This is an impossible task for all but the specialist in insect taxonomy. The magnitude of the problem is immense. There are more species of insects than all other plant and animal species combined. One authority has estimated that over 600,000 insect species have been identified, and these may be only ten percent of the insects yet to be discovered. There are about 250,000 species of beetles, 110,000 butterflies and moths, 100,000 bees, wasps and ants, and so on. There is a constant demand for people willing and able to identify insects.

But prompt control measures can be taken if we can identify the type of insect mouth part that damaged the plant. Only two basic types are involved—chewing and sucking.

Insects with chewing types of mouth parts remove solid tissue by biting it from the plant. This feeding action will usually appear as a hole in the surface of the plant. Occasionally, these insects may bite and chew within the plant. In these cases the insect is not noticed until the affected part of the plant dies. But the important point is that when an insect bites and chews there is a removal and ingestion of a part of the plant. By placing a toxicant on the afflicted part of the plant, subsequent feeding can be readily stopped.

The first evidence of attack by insects with sucking mouth parts is either the insect (in situ) or a yellow, or white necrotic spot on the plant. These insects are quite stationary. Once they have inserted their mouth parts into the plant, most do not readily move. But for an insecticide to kill the pest, it must either penetrate the insect's body wall or enter orally through plant fluids.

The common garden pests with chewing mouth parts are the larvae and adults of the beetles, the larvae of the moths and butterflies, and the grasshoppers, crickets, and

walking sticks. The sucking insects include the leaf hoppers, cicadas, aphids, scales, and true bugs. A good guide to our common insects, available as a paperback ($1.00) is:

Zim, H. S., and C. Cottum. 1951. *Insects, A Guide to Familiar American Insects.* Golden Press: New York. 160 pp.

The importance of these insects and their status as pests is relative, varying with the value and appearance of the plant in the eyes of the gardener. If the gardener believes they detract from his garden, then in his perspective they become pests and subject to control.

Control Measures

Insect pests seldom become numerous enough to warrant control measures. Their numbers are usually few and far between. But occasionally they find a fortuitous combination of environmental factors that provide suitable feeding and living conditions. Then their numbers rapidly expand. We are familiar with the theoretical expansion of Drosophila populations that would bury the world if their number were not somehow checked. But large numbers of insects do provide food for other animals that may feed on insects. These animals may in turn destroy the pests, but while this is happening the plants may have been damaged. Thus the use of direct control measures is a matter of plant, pest, and the time involved before damage is severe.

The use of chemicals does provide a fast and effective means to prevent serious damage. As with insect species, there are large numbers of insecticides. But there are three that are readily available, have been thoroughly tested, and are extremely effective.

The insects with biting, chewing mouth parts that feed externally on the aboveground parts of plants can be controlled with DDT. The sucking insects can be killed with Malathion. Insects inhabiting the soil can be controlled with either DDT or Chlordane. These insecticides are available in formulations as dusts (4 to 6%), wettable powders (25 to 50%), and emulsifiable concentrates (25 to 57%). The dusts may be applied as purchased. The wettable powders and emulsifiable concentrates should be diluted in water to about 1%. This is about a teaspoon in a gallon of water. Specific concentrations can be determined from the labels on the purchased items. Care should be taken with DDT on the foliage of some varieties of azaleas and camellias; Malathion will serve as a substitute. Further insecticide recommendations can be obtained from the U.S. Government Printing Office. May I suggest:

U.S. Department of Agriculture, Home and Garden Bulletins.

No. 46. *Insects and Diseases of Vegetables in the Home.* 1963

No. 53. *Lawn Insects — How to Control Them.* 1964

No. 67. *Insects and Related Pests of House Plants—How to Control Them.* 1963

Precautions

Insecticides are poisons, capable of killing insects and most other animals. They should be used only when needed and as directed. To date it has been difficult to attribute a human death to a *properly used* insecticide. Deaths usually result from the gross misuse of toxicants.

Extreme care should be taken when handling insecticides. Human susceptibility varies widely. The verification of sensitivity may well be positive and terminal. Precautionary measures include the avoidance of prolonged handling. Clean, dry clothing that covers the body should be worn. Smoking should be avoided as it may place contaminated hands close to the mouth. Hands should be thoroughly washed before eating. Antidotes and remedial courses of action should be on hand prior to spraying. Insecticides should be stored in clean, dry, ventilated, and locked cabinets, safe from children.

In many communities local hospitals have established special centers for processing toxicant cases. In Seattle we have:

Poison Information Center
Children's Orthopedic Hospital
4800 Sand Point Way, LA 4-4800

The three insecticides mentioned in this article can be used without specially designed

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The Arboretum Bulletin

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SPECIAL NOTICE

To keep memberships in the Arboretum Foundation in good standing, dues should be paid during the month payable. Active memberships more than three months in arrears will be dropped and The Bulletin will be discontinued.

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The Arboretum Foundation,
University of Washington Arboretum
Seattle, Washington

I hereby apply for membership in the Arboretum Foundation and remittance for same is enclosed to cover dues for the next succeeding 12 months.

Name.....

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All memberships are non-assessable.

Notes and Comments

At the request of the Metropolitan Youth Development Council's Opportunities for Youth Project, the Arboretum is now employing eight teen-age boys from one of the public housing communities in Seattle for four hours each Saturday morning, under the supervision of one of our staff. The Arboretum Foundation has generously agreed to pay the cost of supervision; the boys' wages are paid by funds available to the Council from various sources. It is hoped that this scheme will benefit both the Arboretum and the boys concerned and that it will continue through next summer.

The Director was invited by the Garden Club of America (of which the Seattle Garden Club is a member) to take part in a forum held at the Hotel Pierre, New York City, on November 17, speaking on the subject, "Choice Plant Material of the Pacific Northwest", illustrating his talk with color slides taken in the Arboretum and elsewhere. Principal speaker on the program was Secretary of the Interior Stewart L. Udall. The audience numbered more than 600.

Spring pruning demonstrations will be given by the Director, Mr. Mulligan, on two Saturdays—February 27 and March 20—from 10 a.m. to 12 noon. No registration is necessary and there is no charge.

The winter 1964-1965 may well be remembered along with such disastrous years as 1950 and 1955 if it continues as it started. Beginning with December 15, the maximum temperature was at freezing: the mercury dipped to 11° F that night and rose only five degrees to 16° F as the maximum the next day, went to 13° F the evening of the 17th then rose to 25° F on the 18th. We thus had three days with the maximums at or below freezing. The official thermometer is in a protected area and it is highly probable that certain areas in the Arboretum were several degrees colder than this. A hurried survey among the collections leads us to believe that many of the more tender plants such as the *Acacia* species, *Eucalyptus, Hebe* species,

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Some of Our Favorites☆

☆Won't You Send Us Yours?

Magnolia Stellata

LIKEN a garden to a symphony in four movements, with the plantings as the orchestra. Evergreens and groundcovers carry the background theme throughout the seasons. The delicate *Prunus subhirtella* 'Autuminals' and the yellow *Jasminum nudiflorum* blossoms twinkle flute-like on gray winter days. *Enkianthus campanulatus* and *Oxydendrum arboreum* introduce a crash of tympany in the fall with their glowing scarlet leaves.

For each plant, there is a part to play. Each performs at its appointed time of year —as soloist, in trios, quartets or ensembles. Most important, each is a harmonious part of the entire four-season symphony.

Perhaps the favorite "solo artist" in my garden is *Magnolia stellata,* which grows by my dining room window. Throughout the summer, the crisp green leaves form a ming-tree-like canopy over Williamsianum hybrids and hardy cyclamen, the leaves turning brilliant yellow before they drop in the fall. During the winter, the beautiful branch pattern is accented with 2″ long "pussy willows" which bloom in late March and early April in a profusion of delicate, waxy, white star-like flowers.

The *Magnolia stellata* in my garden grows happily in a well-drained, sandy soil in partial sun. It is now perhaps 8 feet high with as wide a spread, and, each year, my admiration for its performance increases.

PEGGY (MRS. JESSE) WILKINS

Gardens and Fertilizers in Western Washington

(Continued from Page 101)

residues, particularly if they are not properly handled.

This element also has fixation problems in soils, and the proper soil status is hard to determine from a soil chemical analysis. Potassium or potash is commonly supplied in either the sulfate or chloride form. These are called sulfate of potash or muriate of potash. Wood ashes are also high in potassium because the small quantities in wood accumulate as other materials are destroyed.

The concluding discussion will deal with other essential elements.

This is your Arboretum, kept alive by your support

We are pleased to welcome the following new members (September 16 through December 8, 1964):

Sustaining—Mrs. Joseph L. Burns, Mrs. William F. Calderhead, Ralph R. Luce, M.D.; Mrs. John A. Putnam, Mrs. Cecilia S. Urban, Mrs. Neal S. Warren.

Annual—Harold T. Abbott, Mrs. Arthur Allen, Mrs. Reynold A. Atlas, Mrs. William T. Baker, Mrs. Harold H. Beebe, David Bledsoe, Mrs. John R. Bouckaert, Mrs. Walter Brown, Mrs. George Burton, Mrs. D. C. Chapman, Mrs. Viggo H. Conradt-Eberlin, Mrs. L. Mathew Cox, Mrs. Theon R. Deckrow, Mrs. Elmer A. Dehuff, Mrs. Robert S. Douglas, Mrs. Joe C. Finnegan, Mrs. A. M. Fisken, Mrs. Floyd E. Franklin, Mrs. Arthur P. Gardiner, Mrs. William C. Hansen, Mrs. George W. Hobbs, Mrs. John Humenik, Mrs. Robert Johnson, Mrs. J. Jones, Mrs. William Kennelly, Mrs. Dean R. Kirkpatrick, Mrs. Victor L. Klee, Mrs. William R. Knedler, Mrs. Richard D. Kolesar, Mrs. A. R. Krininger, Mrs. Donald H. Laws, Mrs. D. R. Lolley, Mrs. J. E. Malinowski, Mrs. Albert B. Marshall, Mrs. August Martorano, Capt. H. C. Maynard, Mrs. Harrell L. McCarty, Mrs. Archie T. McCauley, Mrs. Donald H. McKechnie, Mrs. Ruth D. Melburn, Mrs. Charles F. Merkle, Mrs. Donald R. Merz, Mrs. H. P. Mittet, John J. Owen, Leona Paulson, Mrs. Ralsey S. Peterson, Mrs. Robert C. Ridgway, Mrs. Max D. Soriano, Mrs. John D. Scott, Mrs. Emil Sedgely, Mrs. Don R. Shannon, Mrs. Warren Eugene Taylor, Mrs. Fred Tharp, Mrs. Neil F. Thorlakson, Mrs. D. Richardson Tucker, Mrs. R. W. VanBuskirk, Mrs. James Webb, Mrs. H. Fletcher Willey, Mrs. T. A. Wilson, Mrs. W. G. Wilson, Mrs. Charles H. Woodward.

We are also most grateful to the following members who have increased their dues to: *Sponsor*—Mrs. Walter Wyckoff. *Supporting*—Mrs. Charles H. Hyde. *Contributing*—Mrs. Frank N. Brooks, H. Dean Stout. *Sustaining*—Mrs. Earl A. Palmeter.

Pat Ballard
1906 - 1964

MRS. Page Ballard was a member of the University of Washington Arboretum Foundation for over twenty years before her death on October 11, 1964. The remarkable thing about this period was the sustained intensity of her feelings toward the Arboretum, and the devoted thoughtfulness with which she plunged into helping the Arboretum become an increasingly vital resource in the Pacific Northwest community and in the world of horticulture.

Pat was born Floragnes Smith, in Bellingham, Washington. After completing her schooling there, she enrolled in the Cornish School of Allied Arts, in Seattle, where she became a devoted, able and much valued pupil of the late Walter Reese, head of the Cornish art department from the mid-twenties till his death in 1943. (It was while she was a student at Cornish that Pat abandoned her given name, which seemed to her not to suit her personality, and she said recently that the change had given her spirits a great sense of release). A year or so after finishing the course at Cornish, she married, in 1930, her fellow student, Page Ballard; and they presently established themselves in their beloved home, called Funnybrook Farm, on a hill above Issaquah. Their house and acres of meadow and woodland there became the focus of Pat's creative genius—indoors and out—a long, loving work of art. There the Ballards entertained numberless friends, many from distant parts of the world, and their guests found it a wonderful privilege to inspect their beautifully gardened fields and woods. The charm is obvious to all; and to the sapient gardener it is, besides, a storehouse of choice and interesting plants, excellently grown.

Pat loved plants for their varied beauties, and was fascinated by her study of their characteristics and functions. Most of all she delighted in generously sharing with others all the interest she found in these studies, and, for months, she pored over her books till the small hours of the night preparing herself to help others make a beginning in botanical reading. Her personal charm drew scores into her "Botanically Speaking" classes and, there, her enthusiasm pointed the way to an enrichment of her students' own lives. It was her vision which spurred the beginnings of the Education Committee of the Foundation, and, for its first five and one-half years, her devoted labor and imagination which promoted its cause and built its schedule of classes on both theoretical and practical subjects, to the limit of the physical facilities available. She was a member of the Editorial Board of this BULLETIN and her contributions to it were written with grace and charm, and exacting care for scientific accuracy. She gave time unstintingly to enrich the programs of the numerous Arboretum Units and her talks on the ericaceous plants so desirable for the gardens of the region, and on the wild birds and how to entice them by planting the kinds of trees and shrubs they enjoy—an art at which she was indeed a past master.

Her rare blend of emotional intensity and intellectual drive made Pat's gifts to the Arboretum of an extraordinary scope and quality. Those of us who remain can only be profoundly grateful for the gift of years Pat put into the Arboretum, and for all she accomplished in her allotted time. D.M.M.

In a warm and loving way we do remember her "ladybugs" and the love with which she shared them with so many of us. We do remember her suitcase or armload of books as she came to Bible meetings or went to her Arboretum sessions. We do remember her ever present pen and notebook in which she sought to preserve the information that could help her to think more clearly and carry her further along the way in her search for truth. We do remember her joy of a class and discussion group "just the right size", her joy at a load of sawdust to mulch her garden, the gleam in her eye when describing a plant, the love in her voice when she talked about her church and its dream for the future.

From the prayer offered at the Memorial Service—by the Reverend John H. Gibson.

Mimi Brandes

TO "keep America beautiful" was a battle courageously and brilliantly waged by Mimi Brandes during her fourteen years' association with the University of Washington Arboretum and, even as death came on September 1, 1964, she was deep in ideas, as a member of a newly formed Citizens' Planning Council, for the beautification of Lake Union.

Born in Vienna, Austria, Mimi Petsching followed her father and sister (her mother having died during Mimi's infancy) to New York in the late 1920's and found America a welcome refuge from post-war Europe. By the mid-30's, she was manager in New York City of one of a large chain of candy stores.

January, 1940, found Mimi vacationing in Tacoma, where her father and sister had subsequently moved, and many times in later years she laughed ruefully over the impression of Washington winters *that* particular January gave her—clear, crisp weather, day after day! The natural beauty of the area, in addition to the "perfect weather," decided her to move to the Northwest and soon again she was managing candy stores, first in Portland and, by 1941, in Tacoma. There she became a member of the Mountaineers, so that the joys of climbing and skiing in her beloved mountains would be heightened by the camaraderie of kindred spirits. To capture the beauty of the world about her, Mimi studied photography and became a charter member of the Photo Alpine Club and her pictures were accepted by several photographic salons.

In 1945 Mimi married Ray Brandes, also a Mountaineer and photographer, and in 1946 they moved from Tacoma to Seattle and in 1948 to Bellevue. The necessity of landscaping their new Clyde Hill home in 1950 aroused in Mimi Brandes the desire to study the profusion of plant materials suitable for this climate. Pat Ballard, with whom Mimi had become acquainted, was organizing a new Arboretum unit, No. 16, for husbands and wives, and the Brandes became charter members. Later, they both were charter members of the Mountaineer Arboretum Unit No. 32 and Mimi was a valued member of the Frances MacBride Arboretum Unit No. 41. From 1950 to 1953, Mimi, who, to quote an April, 1963, article in the *Weyerhaeuser News*, "didn't know a daffodil from a dandelion," studied plant materials, propagation and landscaping at various Arboretum classes and through her membership in Arboretum units. By the time a new Frank Lloyd Wright-designed home on a 20-acre site just across the road from the Page Ballards' near Pine Lake was ready for occupancy in 1953, Mimi had 95 flats of flourishing cuttings to form the nucleus of a naturalistic garden that, in ten years' time, was to become a showplace of the Northwest. Mimi described their garden soil as "a layer of gravel over hardpan," which in all planting beds the Brandes replaced with forest humus from nearby woods. Commercial fertilizers and sprays were never used and the tremendous growth and disease-free plants were adequate testimony to the validity of their gardening methods.

Since she knew so well the back-breaking task of working with poor soil, Mimi Brandes introduced a new section at the annual Arboretum plant sale: "Plants for poor soil, and hot, dry situations"—and was a fount of information on helping the new homeowner beautify her too-often barren, bulldozed tract.

Though English was not her native tongue, Mimi Brandes had a clarity of style and facility of expression which made the Arboretum Unit Quarterly News a joy to read under her editorship from 1958 to 1960.

Shortly before Mrs. Brandes' death, a dear friend was expressing appreciation to her for the perfection of garden design and material which so enhanced her lovely home. She replied: "Through my garden I hope to leave something beautiful to the world." To those who knew her best and could appreciate her great contributions to this adopted country of hers, she left something else of beauty—happy memories of our dear friend.

Auf Wiedersehen, Mimi.

HELEN BUCEY

BOOK REVIEWS

Roadless Area by Paul Brooks. Alfred A. Knopf, New York, 1964. 260 pp., illustrated with drawings by author. $4.95.

ROADLESS AREA, as the name suggests, is about wilderness areas — not just one area, but 14 different areas scattered from Alaska to Baja California; from Massachusetts to the Olympic Peninsula of Washington; from Lake Superior to the Caribbean; and from England to East Africa. It is refreshing to have someone write about wilderness without making it a crusade and condemning everyone who does not think as he does. The author, Paul Brooks, I am sure, knows more about wilderness than the members of special groups who condemn everyone who does not accept their philosophy. He dispassionately points out the need for roadless areas and documents the reasons for his beliefs both sociologically and ecologically.

In the foreword he states, "*Roadless Area* is an official designation for certain tracts of land, such as border-lakes canoe country, which are accessible solely by canoe or trail. I have used it here in a broad sense to cover not only virgin wilderness but also country where the roads, while not far distant, are irrelevant. By extension it might also apply to certain areas of thought about men's relation to wild nature.... The impact deepens with close acquaintance; familiarity with wilderness breeds not contempt but humility.

"Man's craving for wilderness increases in direct proportion to growing urbanization. The more city pavements, the more suburban sidewalks, the more precious become the surviving forest trails. The countryside near our towns and cities is slowly dying of creeping conformity.... Even beyond the cities, beyond the identical main streets of our towns, identical ribbons of concrete threaten the remotest wilderness with the twin blights of sameness and tameness. Wilderness on the other hand represents the very essence of diversity. Yet year by year we whittle away this priceless heritage, forgetting that it is possible for an environment, as well as a species of animal, to become extinct. This slow process of attrition is difficult to dramatize and to publicize. ... The greatest dangers to wilderness have always come under the head of progress; highways for faster travel, dams for water power and irrigation, drainage of marshes that reduce the ducks we want and increase the surplus crops we don't".

The chapters describe separate trips into roadless areas in which he and his wife shared their experiences. In the beginning he states that the authorship of the book was as much his wife's as his own for she shared in everything except the writing. The safari to East Africa was shared by the whole family — his son, his two daughters, his wife and himself.

The author, editor-in-chief of Houghton Mifflin Company, is an ardent conservationist and well known among conservationists. He has been a member of many local and national conservation organizations where he has held portions of responsibility. He participated in the First World Conference on National Parks which was held in Seattle in March 1963.

In the first two chapters the writer takes you through the heart of the canoe country of the Superior National Forest of Minnesota and the Quetico Provincial Park of Ontario. There he tells of the joys of canoeing away from the public; of the less joyful portages which further separate him and his wife from populous camp grounds and resorts. He points out that you are not truly away from the less adventurous and hearty souls until you have passed the third portage.

In his third chapter he takes you into the heart of England by canoe. There was little similarity between this trip and the one described in the first two chapters. While it is not through wilderness, he proves that you can get away from people even in a country as populated as England. Roads were close by, but none in evidence or distracting.

From England he jumps to the Olympic National Park of Washington. There they traveled from the ocean to the snow-covered crest of Mt. Olympus. In this chapter he proves that he is a thoroughly experienced botanist and ecologist. His description of the rain forest, the alpine meadows, the mountains, the sea shore and the wildlife are invitations to visit the area and enjoy the same experiences.

In other chapters he takes you beachcombing in the Virgin Islands, across Isle Royale by foot and plane, into the Great Smoky Mountains of North Carolina and Tennessee, to Alaska and Mt. McKinley, to the west coast of Florida, to Mexico's California and finally on a safari into Kenya and Tanganyika in eastern Africa.

Some of his philosophy of wilderness and its need is set forth in Chapter 15 which is headed "Man and Wilderness".

To share his love of wilderness with others he describes, in an appendix, what he would recommend as essential in outfitting for a trip, whether by canoe or foot. He cautions however that "anyone who has spent much time camping has developed his own list of equipment. A camping list is a very personal thing. One man's luxuries are another man's necessities".

The skill and beauty of his writing he has enhanced by 61 pen-and-ink sketches of trees, flowers, mountains, birds and animals.

Roadless Area is a delightful book to read and one which should be read by all who are interested in the great outdoors.

GORDON D. MARCKWORTH

How to Plan, Establish, and Maintain Rock Gardens by George Schenk, Don Normark, photographs. Lane Book Company, Menlo Park, California, 1964. 112 pages. $1.95. A Sunset Book.

THIS book presents, I think, a brand new approach to rock gardening — at least as books on the subject go. Instead of clinging to the classical definition and description of rock gardens, it begins by coming to terms with the contemporary facts of gardening life in the United States. Mr. Schenk defines American rock gardening as "the decorative garden use of natural stone in any manner other than strictly utilitarian — ; also the cultivation of rock plants in any garden setting, with or without rocks". This definition covers a great deal of territory and makes the book worth having to almost any creative gardener.

The author describes interestingly how the American rock garden has descended from the English, and been influenced by the sand gardens of the Japanese Zen Buddhists, and by the natural rock gardens of the wild mountainous areas which are

now blessedly available to many of us.

Mr. Schenk proposes a garden using rocks in a decorative manner (not precluding usefulness for land retention, but not including that commonplace of the Northwest scene, the rockery), and designed and planted with the thought of labor saving maintenance.

He is himself the creator and proprietor of a large and very beauteous hilltop rock garden with a vast array of exotic, rare, and also more common plants. So it is from a background of solid experience that he explains the design principles and construction of these gardens, — hillside to desert, to woodland, to bog, to scree — allowing for both do-it-yourself and hired labor, and even how to rock garden in clay pots. He does suggest how you may disguise a rockery, if you willy-nilly have one.

Of particular interest to many will be the listing of the American, Scottish and English rock garden societies and a page of specialty nurseries located all across the United States. On the other hand, there are instructions for all kinds of propagation of one's own material.

As Mr. Schenk's great love is for the plants themselves, he of course devotes a substantial section of his book to "Plant Biographies", brief descriptions of the plants' appearance, origins, cultivation, and garden usefulness. These are the shrubs, subshrubs and herbs, and the few coniferous trees appropriate for rock garden use. As the author is undoubtedly aware, a few errors of size, etc., have crept into the descriptions in the first edition of this book, but will likely be corrected for future printings. None of these is of real importance.

Considering that it includes reference to virtually everything of interest to rock gardeners (with or without rocks!) this is an extraordinarily short book, having about 70 typewriter-size pages of rock gardening and 40 of plants. And even of the former, about one-third of the page space is used for the large number of painstakingly excellent explanatory photographs. Mr. Schenk's felicitous prose style makes the book engagingly readable.

DOROTHY METHENY

Controlling Garden Insects

(Continued from Page 103)

clothing or masks *if* they are used as diluted dusts or water sprays. But the direct handling of concentrates or oil solutions should be avoided. If any are spilled on the skin, nose or mouth, they should be washed off immediately. Eye contacts should be flushed with water and given prompt medical attention.

Use of insecticides should be stopped if feelings of nausea, dizziness, or swelling of the hands develop. Headaches are often associated with the use of insecticides. Spraying should stop when these occur.

Prevention

Prevention of insect pests in the garden begins with healthy, vigorous plants. The plants should be planted on appropriate sites, be well spaced and have adequate ventilation. The dense lower branches should be removed. These measures will reduce the damp areas where many insects congregate.

Watering in the garden is a major problem. One good soaking is far better than many light sprinklings. Mulches should be used.

Waste cuttings and pruned material should be removed to compost heaps, or burned.

Occasionally one pest may be frequently encountered. The identification of this pest can be obtained from the county agriculture extension agent. May I introduce our King County Agriculture Extension Agent, Mr. Arthur A. Mehas. Mr. Mehas may be reached at the King County Courthouse. The extension service will provide descriptive literature detailing the life cycle, feeding habits and specific control measures.

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Every Garden Needs a Cold Frame

(Continued from Page 95)

able time and attention but the rewards are handsome indeed. Their variety is endless and all are so lovely that it is impossible to choose among them.

The covered plastic boxes available at the Arboretum Foundation office make excellent containers for propagating ferns from spore. I fill the box to within an inch of the top with a sterile mixture of one-third sand and two-thirds peat moss, it should be moist but not wet. Dust the spore lightly over the surface and thereafter keep the box closed until the prothallia appears. With many species this will happen within a few weeks but some will take from six to nine months or perhaps even longer. It should not be necessary to water so long as the box remains closed but if the surface should appear dry then it should be watered with care so that the spore which is dust-fine will not be washed down into the seeding medium. Once the prothallia appears it must be kept constantly moist by frequent sprinkling to insure fertilization. If your frame is unheated the boxes may be placed on a window sill until the sporlings are large enough to be pricked out. Those that develop promptly will be large enough to spend the summer in the cold frame and can then be planted out in the fall. The very slow ones will have to be kept in the window until the following spring. The young plants must have light shade.

Our shrubs and trees are so satisfactory both for their performance and low maintenance that we often leave no room for herbaceous plants with the result that our gardens lack interest and color at the season when we use them most. With only a little trouble it is possible to have flowers for the house and in the garden all through the summer months. Some things like delphinium, primroses, pansies and even snapdragons can be seeded in August and carried through the winter in an unheated frame to be planted out in early spring. The new shoots that appear around the base of chrysanthemum

plants in the fall can be separated from the main plant and potted to spend the winter in the frame. By this means the stock will not be lost if a severe winter should kill the parent plant. Of course there are all the annuals that come so quickly from seed sown in the spring. These can be brought into bloom six weeks earlier by starting them in the heated frame.

Most of our woody plants can be propagated by cuttings placed in the garden frame. Many will root easily without heat but all will root faster and in larger percentages with bottom heat. I have suspended a pipe with fogging nozzles above a heated frame and removed the sash entirely for the purpose of rooting cuttings during the summer months. This has been an improvement over the closed frame that I had used previously. Cuttings from most deciduous plants such as azaleas, quince, weigela, stuartia are taken in the early summer. They will be rooted by early fall and should then be removed to a cool protected situation. They seem to need a cool resting period or the buds will not break in the spring. I do not remove them from the flats until spring. By the time the deciduous things are moved out of the frame it will be time to take cuttings from such evergreens as *Photinia, Rhododendron, Pieris* and others.

At about this same time you might like to pot some bulbs for later forcing in the frame. It is wonderful to have them for the house in the late winter or early spring. Both the bulbs and cuttings will be out of the frame in time for spring seed sowing. If the frame is well managed it can produce such a constant supply of plant material that it will soon be a wonderful resource for the Arboretum Unit Plant Sale.

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Some Notes on the Mountain Flora of Vancouver Island

(Continued from Page 99)

recognized it from the foliage, being familiar with it in the Olympic range. I realized that this plant must have seeded itself down from high on the ridge above, and later I found plants in bloom at well over 6000 feet. During the years, I now have several stations for this plant, but all in the same general area, and all stations seem to be well above the height of ice from the last glacial age. Associated with the *Douglasia* were occasional plants of *Loiseluria procumbens*—the tiny leaved northern form—(this somewhat scarce on this Island, but very common at similar altitudes across the gulf from us on the Coast range)—the aforementioned *Lloydia,* as well as tangled mats of *Penstemon, Potentilla* and *Empetrum nigrum.* Being familiar with the flora of the Olympic Mountains, my first thought after seeing the *Douglasia* in bloom was to scout around for some of the other plants which could have survived the last glacial period along with *Douglasia.* Despite the fact that geologic conditions are similar to those obtaining at the same altitudes in the Olympics, so far I have not succeeded in discovering plants of Olympic endemies such as *Campanula Piperi* or *Petrophytum Hendersoni.* However, one lives in hopes, though increasing years add to the difficulty in exploring the very rough country where most of these rarer treasures grow, or should grow. I have found that one cannot depend too much on climbing parties being much help in bringing out specimens, you just have to go yourself. The uninitiated will normally only take note of something in bloom, if not in showy bloom it will seldom register, even if one provides precise descriptions of plant and leaf. A climbing friend was once going to an isolated peak, and offered to bring out what I could suggest that might be of interest to me. I immediately thought of the *Douglasia,* and described and sketched the plant for him in some detail. He came out some time later, triumphantly bearing specimens of *Sibbaldia*

procumbens! However, as a reverse twist to this, is the story I am fond of telling about an old friend who had a climbing caller come to see him in much the same way. My friend told his caller that he would be happy to get a plant of a pure white form of *Penstemon fruitcosus* var. *menziesii*. To his utter amazement, a week or so later his climber appeared bearing such a plant—to my knowledge the only one ever found before or since on Vancouver Island!!

In conclusion, I must apologize for these rather rambling remarks—but anyhow I *do* belong to a group known as the V. I. Mountain Ramblers, dedicated to exploration and conservation of our wilderness areas. Only this past summer some members of our group climbed and named a peak, hitherto unclimbed and unnamed—Rambler Mountain; on the slopes of which grow plants of *Douglasia laevigata*. This is an area I have yet to visit, but am laying plans for next season—and who knows; maybe I will yet find Piper's Campanula and Flett's Violet in that same area!

A Further Report on the International Friendship Grove

(Continued from Page 84)

men convinced the author of a deep and continuing sentimental attachment for the Grove. It was a state of mind that fortifies international good will.

Using a young grandson, who fortuitously chose to be born just a few weeks before the 1960 planting, as a growth measuring stick, the author has continued to take color photographs each succeeding year. He now has a four-year sequence of some trees and a sequence of panorama shots as well. Thus far, this has been just a personal project.

The International Friendship Grove was, and continues to be, a most worthy venture in international good will. The individual trees which comprise it have proven a heritage of good selection and expert planting. With each passing year they add both stature and impressiveness. International friendship is a long-lived objective. The trees, too, are long lived.

In the humble opinion of the author, there is one essential ingredient lacking in the International Friendship Grove. It is an orphan. No one continuing, long-lived, interested and dedicated organization of people who love trees and understand them has come forth as champion and steward. There is need for such an organization to interest itself in the physical welfare of the Grove, to enhance its visitor potential, and to nurture the international friendship idea by maintaining friendly and periodic contact with men and women of the nations whose tree roots now search for life in the Mother earth of Campus Parkway.

The Conservation Forum

(Continued from Page 97)

national, regional or state chapter offices those special local sites needing perpetual protection. Active participation or simply membership in the Washington Chapter of Nature Conservancy may be given the kind

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The Conservation Forum

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of response the readers of the BULLETIN may wish to make. Inquiries may be directed to the Chapter's headquarters, Washington Chapter of Nature Conservancy, Box 216, Bellevue, Washington.

Landscaping Scientific Research Center at The Boeing Company

(Continued from Page 93)

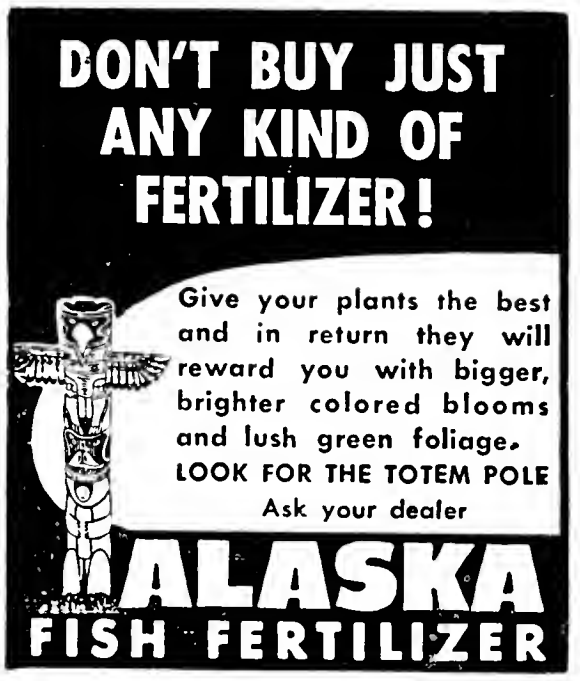
sidewalk areas to direct pedestrian traffic. Careful planning went into the placement of park benches, separated by plantings, so individual groups of people could converse independently of each other.

We in the landcape and nursery business are very pleased that firms like The Boeing Company are making such an effort to improve and enhance their industrial sites. We almost feel that industry is replacing some of the fields of art that might otherwise be fading in our industrial age.

Notes and Comments

(Continued from Page 104)

some rhododendrons, a few *Camellia japonica* clones, evergreen oaks, and the like suffered extensive leaf burning and very likely some bud and stem damage. It is too soon to make any predictions yet since our cold month, January, has only just begun, but it appears that we may be in for trouble.



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